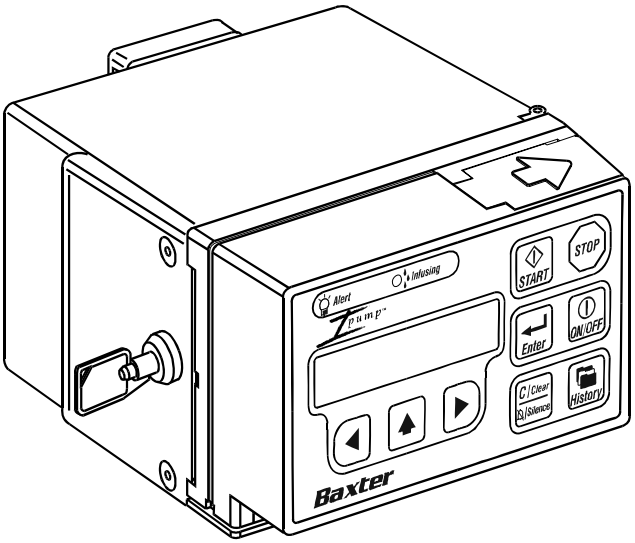

Ipump Pain Management System

SERVICE MANUAL

For use with Ipump devices with hardware revision 2 (HW Rev 2).

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Contents

Chapter 1 - Introduction

Overview - - -

Chapter 3 - Care & Routine Maintenance

Overview - 3-1
Cleaning and Disinfecting - 3-1

Chapter 4 - Troubleshooting

Overview - 4-1
Reviewing the Alarm Log- 4-1
Troubleshooting - 4-3
System Error Codes - 4-5
Range 10 - 2V -- Peripheral/Sensor Errors - - - - - - - - - - - - - - - 4-5
Range 30 - 47 -- Motor Control Errors - - - - - - - - - - - - - - - - - 4-6
Range 50 - 52 -- RTC Errors - 4-7
Range 60 - 62 -- Power Supply Errors- - - - - - - - - - - - - - - - - - 4-7
Range 70 - 74 & L0 -- MPU Errors - - - - - - - - - - - - - - - - - - - 4-7
Range 75 - 8D -- Processing Errors - - - - - - - - - - - - - - - - - - - 4-8
Range 90 - 9Z & M0 - P3 -- Data Corruption Errors - - - - - - - - - - 4-8
Range A0 - J1 -- Processing Errors - - - - - - - - - - - - - - - - - - 4-10

Chapter 5 - Functional Tests

Overview - 5-1
General Information - 5-2
Equipment Required - 5-3
Optional Equipment - 5-3
Exterior Visual Inspection - 5-3
Configuration Settings - 5-4
Flow Rate Accuracy Test- 5-6
Test Setup - 5-7
Procedure Using the Gravimetric Method - - - - - - - - - - - - - - - 5-7
Procedure Using the Volumetric Method - - - - - - - - - - - - - - - 5-8
Downstream Occlusion Calibration Pressure Test - - - - - - - - - - - - 5-8
Operational Checks - 5-9
Test Set Up - 5-9
Power-On Self Test (POST) - 5-9
Keypad Operation Test - 5-10
Bag Cover Lock/Unlock Test - 5-10

Tubing Sensor Test - 5-10
Occlusion Sensor Test - Downstream - - - - - - - - - - - - - - - - - - 5-11
Occlusion Sensor Test - Upstream - - - - - - - - - - - - - - - - - - - 5-11
Air Sensor Test - 5-12
PCA Cable & Button Test - 5-13
AC Adapter Test (Optional) - 5-13
History Retention Test (Backup Battery Check) - - - - - - - - - - - - 5-14
Printer Test (Optional) - 5-14
Unintended Shutdown Circuit Test - - - - - - - - - - - - - - - - - - - 5-14
Functional Test Data Sheet - 5-15

Chapter 6 - Disassembly & Reassembly

Overview - 6-2
Tools & Materials - 6-2
Required Tools & Equipment - 6-2
Consumable Materials - 6-3
Baxter-Created Tools & Equipment - - - - - - - - - - - - - - - - - - - 6-3
Disassembly Procedures - 6-4
General Disassembly Information - 6-4
Bag Cover Assembly Removal - 6-4
MPU PCBA Handling Guidelines - 6-5
Rear Case Assembly Removal - 6-6
Mechanism Assembly, DDMM PCBA, & Battery Wall Removal - - - 6-7
MPU PCBA Removal - 6-8
ESD Flex Circuit Removal - 6-9
LCD Module Removal - 6-10
Optional Procedures - 6-11
3V Backup Battery Replacement - 6-11
Initializing the 3V Backup Battery - - - - - - - - - - - - - - - - - - - 6-12
Keypad Replacement - 6-12
Assembly Procedures - 6-15
Torque Specifications - 6-15
Installing the Front Case & Keypad Assembly - - - - - - - - - - - - 6-15
Installing the ESD Flex Circuit - 6-15
Installing the Display ESD Shield - - - - - - - - - - - - - - - - - - - 6-18
Installing the LCD Module - 6-18

MPU PCBA Handling Instructions - - - - - - - - - - - - - - - - - - - 6-19
Installing the MPU PCBA - 6-19
Installing the Battery Wall & DDMM PCBA - - - - - - - - - - - - - 6-23
Installing the DDMM PCBA Hold-down Foam - - - - - - - - - - - - 6-24
Installing the Mechanism Assembly - - - - - - - - - - - - - - - - - 6-24
Installing the Battery Door - 6-25
Pump Calibration - 6-25
Internal Inspection - 6-26
Closing the Case - 6-27
Pump Functional Tests - 6-28
Optional Assembly Procedures - 6-28
Installing the Bag Cover Assembly - - - - - - - - - - - - - - - - - 6-28

Chapter 7 - Internal Tests & Pump Calibration

Overview - 7-1
3V Backup Battery Test - 7-2
Battery Load Test - 7-2
Battery No Load Test - 7-3
Calibration Procedure - 7-4
Equipment Required - 7-4
Initial Setup - 7-4
Downstream Occlusion Calibration - - - - - - - - - - - - - - - - - 7-5
Upstream Occlusion Calibration - - - - - - - - - - - - - - - - - - - 7-6
Air Sensor Calibration - 7-8
Downstream Occlusion Calibration Pressure Test - - - - - - - - - - 7-9
Calibration Data Sheet - 7-11

Chapter 8 - Electronic Assembly Drawings

Overview - 8-1
Interconnecting Wiring Diagram - - - - - - - - - - - - - - - - - - - 8-1
Keypad Cable & Motor Connectors - - - - - - - - - - - - - - - - - - 8-2
Mechanism Assembly Flex Circuit Connector - - - - - - - - - - - - - 8-2
MPU PCBA Assembly - 8-3
Direction & Drive Motor Module PCBA (DDMM) Daughter Board - - - - 8-4

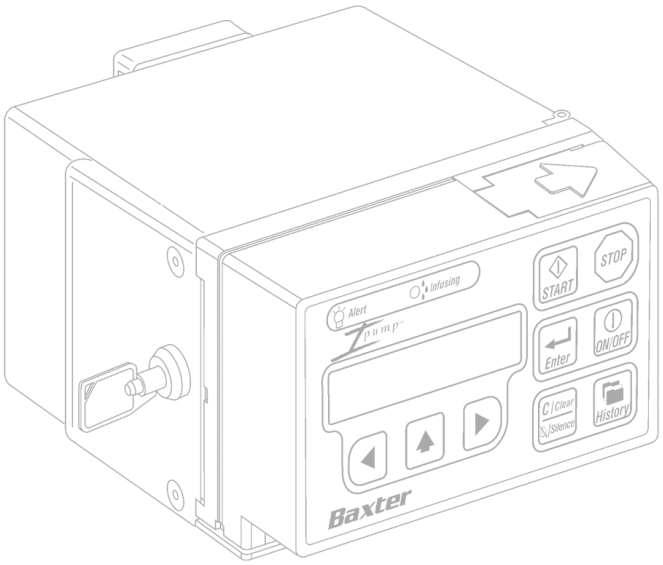
Chapter 9 - Repair Parts

Overview - 9-1
Assembly Parts List - 9-2
Bag Cover Assembly - 9-2
Rear Case Assembly - 9-3
Pump Mechanism & Battery Compartment Assemblies - - - - - - - - 9-4
MPU Board Assembly - 9-5
LCD Circuit Board & Front Case Assemblies - - - - - - - - - - - - - 9-6
Alphabetical Parts List - 9-7
Numerical Parts List - 9-9

Chapter 10 - Product Updates

Overview - 10-1
Limited Warranty

Contents


Alert
Infusing
START
STOP
Enter
ON/OFF
Clear
Silence
History
Baxter

1 - Introduction

In this section **Page**

Overview 1-1
Pump Accessories 1-2
Manual Layout 1-2
Factory Service & Assistance 1-3
Technical Assistance, Service, & Repairs 1-4
Safety Summary 1-4
Definitions 1-4
Warnings 1-5
Cautions 1-5
Notes 1-6
Labeling Symbol Definitions 1-6

Overview

The **Ipump** Pain Management System (hereafter referred to as the "pump") is indicated for the controlled delivery (continuous, intermittent, and continuous plus intermittent) of analgesic, sedative, and anesthetic solutions through clinically acceptable routes of administration including intravenous, subcutaneous, and epidural, and for regional (local) analgesia applications.

This lightweight, compact pump can be battery operated for portability or connected to an AC power source for stationary use. A specially designed optional locking pole-mounting clamp allows the pump to be attached to a standard IV pole. With the pole clamp removed, the pump can be placed into a comfortable carrying case.

This manual contains service and maintenance information for all **Ipump** Pain Management System products (product codes 2L3107, 2L3107R, and 2L3107K) with hardware revision 2 (HW Rev 2). This information is intended for qualified biomedical personnel and Baxter authorized service representatives.

This manual provides a basic understanding of the internal workings of the pump, functional test procedures, troubleshooting, complete assembly/disassembly instructions, and a replacement parts list.

For complete operational and precautionary information, pump specifications, and cleaning instructions, refer to the ***Ipump*** *Pain Management System Operator's Manual* (p/n 07-19-x4-766). For pump installation and configuration, refer to the ***Ipump*** *Pain Management System Configuration Manual* (p/n 07-19-x4-768).

CAUTION Only trained, qualified personnel should perform procedures in this manual. Except for the procedures and replacement parts included in this document, no other disassembly or repair should be attempted.

Baxter Healthcare Corporation provides a one-year limited warranty for new **Ipump** devices. If a pump requires warranty service, call Baxter Healthcare Corporation for repair. Unauthorized repair of a pump before the warranty has elapsed voids the warranty.

Pump Accessories

Description	Catalog Number
100 mL Bag Cover	2L3218
250 mL Bag Cover	2L3220
250 mL Extended Bag Cover	2L3217
250 mL Extended Bag Cover, Amber	2L3261
500 mL Bag Cover	2L3221
Printer Adapter	2L3400
Printer Adapter Cable	2L3402
Patient Controlled Analgesia (PCA) Button	B069140003RP
Locking Pole Mount Clamp	2L3211
Non-locking Pole Mount Clamp	2L3212
Pump Carrying Case (250 mL)	2L3219
AC Adapter (220-230V)	2L3205K
AC Adapter (100-120V)	2L3210
AC Adapter Holder	2L3214
Configuration Transfer Cable	2L3112
Yellow Face Plate Label	072742210

Manual Layout

This manual is divided into the following sections:

Chapter 1 (Introduction) provides an overview of the contents of this Service Manual and includes Warnings and Cautions concerning the use and care of this product. Warnings and Cautions are also located where needed throughout this manual.

Chapter 2 (Theory of Operation) details the functional features of the pump. A general overview of the pump's operation and a functional block diagram are provided.

Chapter 3 (Care & Routine Maintenance) includes the routine maintenance and cleaning procedures with recommended cleaning agents. Battery replacement procedures are also included.

Chapter 4 (Troubleshooting) contains troubleshooting tables and procedures for localizing mechanical or electronic faults. A table of System Error Codes is also included.

Chapter 5 (Functional Tests) provides the tests that are to be used to ensure that the pump operates properly. Baxter recommends that these tests be performed on an annual basis as a preventive maintenance procedure. In addition, these tests must be performed whenever the Mechanism Assembly and/or the MPU PCBA is removed or replaced.

Chapter 6 (Disassembly & Reassembly) provides disassembly, replacement, and reassembly instructions. Required tools and test equipment are specified. Adjustment procedures are provided along with the required torques and tolerances. Replacement procedures for the 3V Backup Battery and the Keypad are also included.

Chapter 7 (Internal Tests & Pump Calibration) contains the procedures required to test the 3V Backup Battery and to calibrate the pump. The calibration procedures must be performed after replacement of either the Mechanism Assembly or the MPU PCBA.

Chapter 8 (Electronic Assembly Drawings) contains the assembly drawings for the interconnecting cables and flex circuits used in the pump.

Chapter 9 (Repair Parts) provides exploded view drawings and parts lists of field-replaceable parts and assemblies.

Chapter 10 (Product Updates) contains major updates and additional information for the pump. This information will be listed by hardware and software revision numbers and/or product serial number. Product Service Bulletins should also be placed in this chapter of the manual.

Factory Service & Assistance

Baxter Healthcare Corporation provides a one-year limited warranty for each pump. (See the inside back cover of this manual for warranty details.) If a pump requires warranty service, call Baxter Healthcare Corporation for repair. While under Baxter Warranty, Service Agreement (optional), or Lease Agreement, the pump must not be opened by unauthorized personnel. Unauthorized repair of a pump before the warranty has elapsed voids the warranty.

If factory service is desired, pumps may be returned to Baxter Healthcare Corporation for repair. Always call for a return material authorization number before shipping any pump to Baxter Healthcare Corporation.

When calling for service, please be prepared to provide the product code and serial number of the pump. A brief written description of the problem should be attached to the pump when it is returned for service.

Shipping costs for all pumps returned to Baxter shall be paid for by the customer. The pump must be packed in its original container or in another container that will provide adequate protection during shipment. To ensure prompt return, a Baxter authorized service representative must be notified before shipping any pump for repair.

Baxter Healthcare Corporation will not be responsible for unauthorized returns or for pumps damaged in shipment due to improper packing.

Technical Assistance, Service, & Repairs

For technical assistance, parts ordering, and service return authorization, contact the Baxter Healthcare Service Center:

Inside the U.S.: Call 1-800-THE-PUMP (843-7867)

Outside the U.S.: Contact your local Baxter representative.

Safety Summary

General precautions to observe while using the pump are shown below. Standards under which this product is designed, built, and marketed are also included.

- Before operating the pump, carefully read the operator's manual to fully understand the pump's functionality and to ensure safe and proper operation. An operator's manual is shipped with each pump.
- Although the pump has been designed and manufactured to exacting specifications, it is not intended to replace trained personnel in the supervision of infusion therapy.
- Read and understand this manual before attempting to perform service or maintenance on the pump.
- To ensure that the pump continues to perform within specifications, perform the Routine Maintenance procedures described in Chapter 3 of this manual when recommended.
- This manual has been developed with consideration to the requirements in the International Standard, IEC 60601-2-24 (1998-02) Medical Electrical Equipment — Part 2-24: Particular Requirements for Safety of Infusion Pumps and Controllers.
- This product is classified by Underwriters Laboratories Inc. with respect to electric shock, fire and mechanical hazards only in accordance with UL 60601-1 Medical Electrical Equipment - Part 1: General Requirements for Safety.

Definitions

Certain items in this manual are highlighted by special messages. The definitions of the various types of message are provided below.

! WARNING ! **Indicates a possible hazard which, if ignored, could result in severe personal injury or death.**

CAUTION Indicates a problem or unsafe practice which, if not avoided, could result in minor or moderate personal injury, or product or property damage.

NOTE: Provides supplemental information to the accompanying text.

Warnings

! WARNING ! **This pump should be repaired only by trained, qualified personnel using Baxter-recommended parts. There are risks associated with using anything other than Baxter-recommended parts and procedures. Baxter will assume no responsibility for incidents which may occur if the product was not repaired by qualified Baxter employees.**

! WARNING ! **If the pump has been dropped or appears to be damaged, it should be taken out of service and inspected by qualified service personnel.**

! WARNING ! **To ensure safe and proper operation, read the *Ipump Pain Management System Operator's Manual* and any instructions accompanying disposables or accessories before operating the pump.**

! WARNING ! **When attaching the pump to an IV pole, ensure it has been securely clamped and locked.**

! WARNING ! **As with all medical electronic equipment, care must be exercised to avoid exposing this pump to powerful sources of electromagnetic interference. Using the pump near operating equipment which radiates high energy radio frequencies (such as electrosurgical/cauterizing equipment, two-way radios, or cellular telephones) may cause false alarm conditions. If this happens, reposition the pump away from the source of interference.**

Cautions

CAUTION In the U.S., use of this pump is restricted by federal law (USA) to sale or use by, on the order of, or under the supervision of a physician or other licensed health care professional.

CAUTION DO NOT operate this infusion pump in the presence of flammable anesthetics, ether, oxygen-enriched, or explosive atmospheres.

CAUTION DO NOT expose the pump to X-rays, gamma rays, or other ionizing radiation, or to strong electric or magnetic fields.

CAUTION Wipe off spills immediately. DO NOT allow fluid or residue to remain on the pump.

CAUTION Ensure proper maintenance of the pump by following the cleaning schedule and methods described in this manual.

CAUTION Do not clean, disinfect, or sterilize any part of the pump by autoclaving, or with ethylene oxide gas. Doing so may damage the pump and void the warranty. Only external parts of the pump should be disinfected.

CAUTION Refer all service, repair, and calibration to trained, qualified personnel.

CAUTION To reduce the risk of electrical shock, only trained, qualified personnel should disassemble this product.

CAUTION For best performance, routine maintenance procedures must be performed. (Refer to Chapter 3 of this manual.)

CAUTION Wear a grounding wrist strap when disassembling and reassembling the pump.

CAUTION DO NOT lay the pump face down on any surface which could scratch or damage the keypad or the display.

CAUTION When troubleshooting the pump, do not inject or apply signals of any kind. Damage to the pump or its sub-assemblies could result.

CAUTION Motor and sensor magnets may attract metal debris to motors or circuit boards. To prevent debris from entering the pump mechanism, always maintain a clean work area when performing procedures involving the pump mechanism.

CAUTION To avoid personal injury, ensure that the IV pole is stable and secure. Ensure that the pole is able to support the pump, along with any other devices, without tipping or falling. The pole diameter should be between 0.5" and 1.25" (1.3 cm and 3.2 cm).

Notes

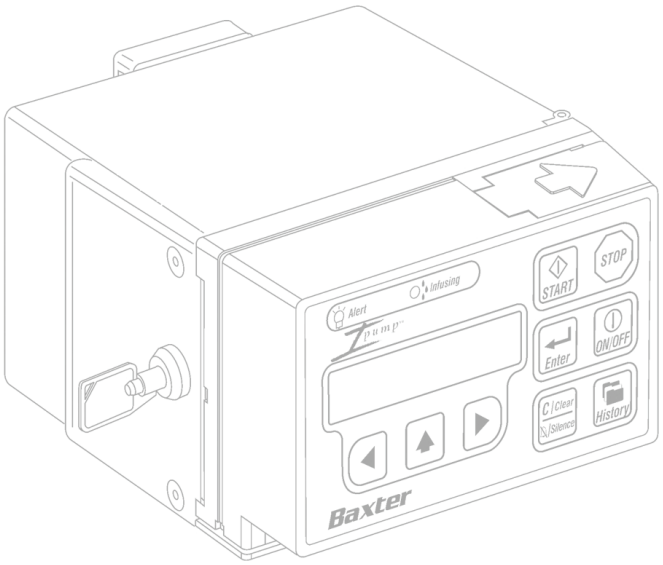
Baxter requests that parties acquiring this pump:

- Promptly report the receipt of this pump to the manufacturer.
- Report the pump's purchase, receipt in trade, return after sale, loss, destruction, or retirement.
- If this is an initial purchase from the manufacturer, please return a signed copy of the packing list to the manufacturer.

Labeling Symbol Definitions

IPX1	Drip-proof equipment: enclosed equipment protected against dripping fluids.
AC	Connection port for the AC to DC converter/adapter.
	CAUTION, Consult Accompanying Documents
	Type CF applied part. (The **"**Type CF Applied Part**"** symbol indicates the level of electric shock protection for the patient-contacting parts such as the PCA button and the IV set. UL/IEC/EN 60601-1 defines Type CF as providing greater protection than Type B or Type BF.)
	Electrostatic Sensitive Devices (The pins of the PRINTER/COMM connector are subject to Electrostatic Discharge and should not be touched. Refer to page 2-7 for additional information.)

	Recyclable, dispose of properly.
	This product is classified by Underwriters Laboratories Inc. with respect to electric shock, fire, and mechanical hazards only in accordance with UL 2601-1 (UL 60601-1), CAN/CSA C22.2 No. 601.1, and IEC 60601-2-24.
	Symbol (WEEE 2002/96/EC) Crossed-out wheeled bin For product disposal, ensure the following: - Do not dispose of this product as unsorted municipal waste. - Collect this product separately. - Use collection and return systems available to you. Bar below bin - Product distributed after August 13, 2005. For more information on return, recovery, or recycling of this product, please contact your local Baxter representative.
	Manufacturer
	Authorized Representative in the European Community
REF	Catalog Number
SN	Serial Number


Alert
Infusing
START
STOP
Enter
ON/OFF
Clear
Silence
History
Baxter

2 - Theory of Operation

In this section **Page**

Overview 2-1
System Components 2-2
- **Ipump** System Functional Block Diagram 2-2
- MPU Circuit 2-3
- BUS Subsystem 2-3
- Keypad & Sensors 2-4
- PROM 2-5
- Supervisory Subsystem (SS) 2-5
- Power Subsystem (PS) 2-5
- LCD Subsystem 2-6
- Silent Shutdown System 2-6
- Motor Subsystem 2-7
- Occlusion Detection Circuit 2-7
- Air Sensor Circuit 2-7
- Printer Adapter Interface Circuit 2-7

Overview

The **Ipump** Pain Management System is a small, lightweight, linear peristaltic pump that may be operated from battery or AC power. An optional pole-mounting clamp allows the pump to be unlocked and easily removed for pump placement into a convenient carrying case. See the list of pump accessories on page 1-2.

The user can program the pump with prescribed values for the therapy desired. A number of security options are available in order to enter prescription parameters from the keypad. Once programmed with prescription parameters, the pump operates with these settings until the operator turns the pump off or re-enters the programming screens and changes the prescription. A record of the previous prescription and therapy history are retained while the pump is in operation or turned off. The user can choose to use the previous prescription, review the history by pressing the **HISTORY** key, or clear the history by pressing the **CLEAR** key.

The pump can be configured to require a key to unlock and open the pump bag cover to change a prescription. The pump can also be configured to require either a security code, or both a key and a security code, to gain applicable access.

The pump can be programmed for specific modes, units, and/or prescription limits. This is accomplished by accessing the configuration screens during initial start-up. To access the configuration mode refer to the ***Ipump*** *Pain Management System Configuration Manual* and the ***Ipump*** *Pain Management System Operator's Manual*. Once programmed, the pump will remain in that configuration until purposely changed.

The pump configuration can be transferred between two **Ipump** devices for the configuration of multiple pumps. An optional configuration transfer cable, available from Baxter, is required. See the list of pump accessories on page 1-2.

The remainder of this chapter provides a basic explanation of the pump's internal operation.

System Components

The pump is divided into modules and subsystems. Figure 2-1 is a functional block diagram of the system and not intended to illustrate component location. The modules and subsystems listed below are discussed later in this chapter.

- MPU Circuit
- Bus Subsystem
- Keypad
- PROM
- Supervisory Subsystem
- Power Subsystem
- LCD Subsystem
- Silent Shutdown Circuit
- Motor Subsystem
- Occlusion Detection Circuit
- Air Sensor Circuit
- Printer Adapter Interface Circuit

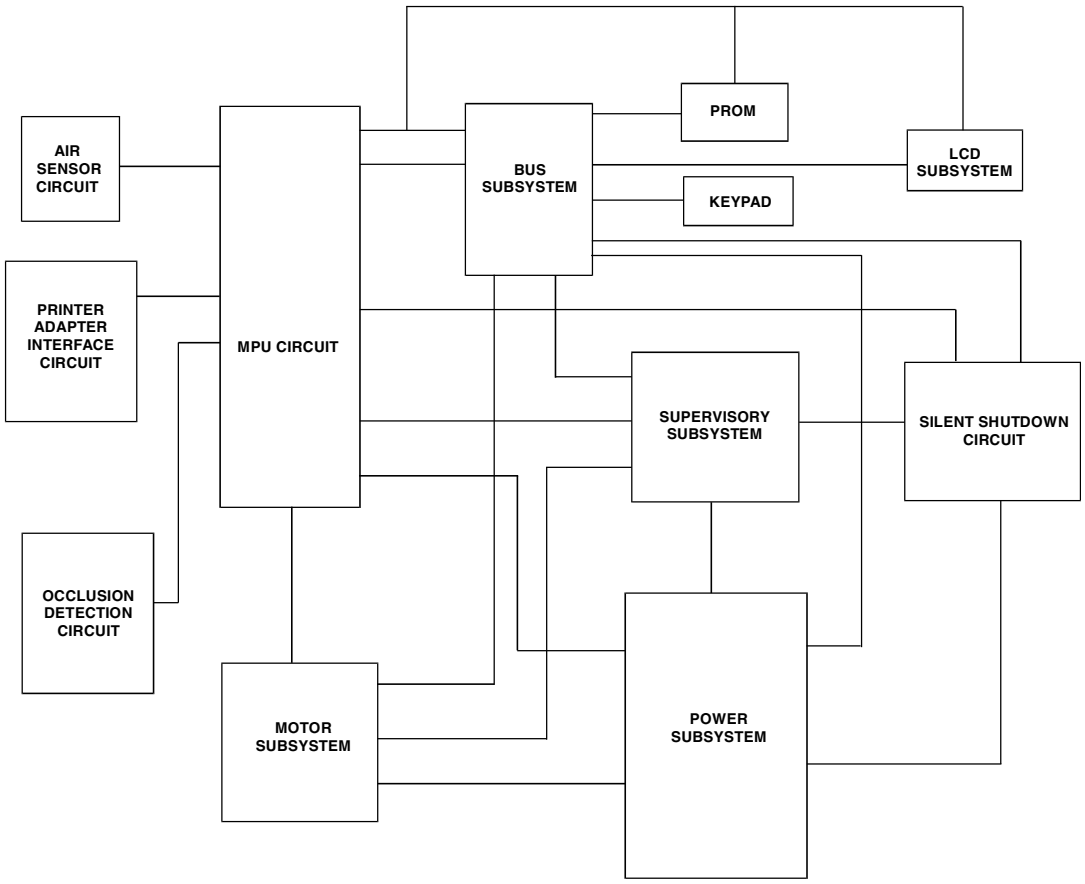


Figure 2-1. Ipump System Functional Block Diagram

MPU Circuit

The pump uses a 16-bit micro-controller and an external PROM. The 16-bit micro-controller contains hardware timers, analog to digital converter, RAM and PROM, and the microprocessor. This application of the micro-controller uses the internal RAM and PROM whenever possible to save power, which is a major feature of this pump. The memory expansion mode is only used when accessing functions on the external bus. The microprocessor has eight input/output (I/O) ports which are used to control or monitor the following functions:

- PROM
- Motor Subsystem
- Keypad
- Silent Shutdown Circuit
- Occlusion Detection Circuit
- Various voltages
- LCD Subsystem
- Watchdog
- Switches
- Real Time Clock Circuit
- Air Sensor Circuit

A number of power-up tests are performed to ensure that the pump is running properly. The power-up tests include testing of the LEDs, memory, display, beeper, backup battery, and input voltages. If an error is detected, the processor will initiate a 2-character error code which will produce an alert message and an audible alarm.

Included in the processor subsystem is the real time clock (RTC) circuit. The RTC provides time of day information to the microprocessor. The RTC circuitry keeps track of time while the pump is off, through the use of a backup battery mounted to the microprocessor circuit board. The backup battery is also used to preserve the contents of the microprocessor RAM when operating power drops below a minimum voltage. The RTC also contains a small amount of RAM that is used by the system software to determine whether there has been a loss of backup battery power.

BUS Subsystem

The BUS has the capacity to provide for a 24 bit address and 8 bit data path. The microprocessor uses the BUS subsystem to transfer data or instructions to seven different functions. These functions are:

- PROM
- Motor Drive
- Keypad
- Real Time Clock (RTC)
- LCD Command and Data Register
- Watchdog
- Switches

Keypad & Sensors

The Keypad is comprised of nine keys which enable the user to turn the pump Off and On, enter the prescription data, and START and STOP an infusion. In addition to monitoring each of these keys, the microprocessor also checks the status of ancillary inputs consisting of internal switches, sensors, and connectors. Refer to Table 2-1 and Table 2-2 for a description of the Keypad keys and ancillary inputs.

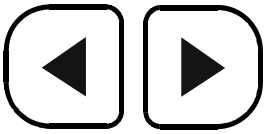
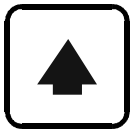
Key	Description
	The START key begins the operation of the pump and can also be configured to act as a PCA button. If all of the required programming values have been entered, the START key initiates the infusion from any programming screen. Following the resolution of most alerts or alarms, pressing the START key resumes the infusion if the condition no longer exists.
	The STOP key must be pressed twice within 1 second to stop the operation of the pump. After the pump is stopped, you can press the ON/OFF key to turn the pump off.
	The ENTER key sets the value displayed on the Liquid Crystal Display (LCD) screen.
	The ON/OFF key powers up and powers down the pump. If the pump is on, you can press the key: • once to deactivate the programmed settings, which can be retrieved. • twice to power off the pump.
	The CLEAR/SILENCE key either clears the data shown on the LCD screen or silences an alert or alarm signal generated by the pump.
	The HISTORY key displays the infusion history on the LCD screen. Pressing this key again allows you to scroll through the history screens.
	The left and right arrow keys move the cursor on the display screen to the left and right.
	The scroll (up arrow) key displays the next available option on the pump's screen.

Table 2-1. Keypad Keys

Feature	Primary Function
PCA Jack	Patient Controlled Analgesia (PCA) connector. The PCA cable connects to the pump via a phono jack and plug style connection which is monitored by the microprocessor to determine the status of the PCA button.
Printer Jack	The printer jack allows the connection of the Baxter Printer Adapter (p/n 2L3400), and a printer (typically a Seiko DPU-414).
Bag Cover Lock	An internal sensor detects when the bag cover is locked or unlocked when the pump is configured with either security method “key + code” or “key only.”
Tubing Sensor	An internal sensor that detects when the pump tubing cover is open or closed with the administration set properly installed.
Upstream Occlusion Sensor	An internal sensor that detects when an upstream occlusion occurs.
Downstream Occlusion Sensor	An internal sensor that detects when a downstream occlusion occurs.
Air Sensor	An internal sensor that detects when there is air in the tubing segment inside the pump.

Table 2-2. Ancillary Inputs

PROM

The PROM subsystem supplies data to the bus when addressed by the microprocessor to identify the operation requested. An EEPROM is also provided in the microprocessor and PROM subsystem to retain configuration information.

Supervisory Subsystem (SS)

The supervisory subsystem performs a major role in the start-up and shutdown of the pump. It also monitors and responds to error situations reported by the hardware and software. A “wellness check” is performed by the SS on some of the error detection hardware circuitry.

The SS also provides the power for the microprocessor and the Real Time Clock (RTC). As long as the regulated +5V remains above the backup battery voltage, the SS will produce a +5V source for the microprocessor and the RTC. If the regulated +5V falls below the backup battery voltage, the SS connects the backup battery to the microprocessor and the RTC to preserve the contents of the microprocessor RAM and provide power for RTC operation.

Power Subsystem (PS)

The power subsystem provides the required DC power for the pump from either a 9-volt battery or an optional AC Adapter. The AC Adapter is an external device, which will provide 10 volts DC when plugged into an AC wall outlet. The AC Adapter is connected to the pump at its AC Adapter input jack. When power is available from both the battery

and an AC Adapter, the PS selects the AC Adapter by default to conserve battery life. The PS automatically switches the LCD backlight on when the AC Adapter power is present.

The PS provides regulated, partially regulated, and unregulated power. In the event that both the battery and AC Adapter are not present, the PS, in conjunction with the SS, will switch the microprocessor and RTC power to the backup battery. This maintains the contents of the microprocessor RAM and keeps the RTC operational.

The unregulated voltage is used primarily to power the motor that drives the peristaltic pump. The partially regulated voltage is used to power the buzzer and the LCD's backlight circuit. The partially regulated supply is monitored for low voltage to shut down the pump. The unregulated voltage is also used as a monitored voltage for the overvoltage fault detector. The regulated voltage is supplied to all of the IC chips.

LCD Subsystem

The liquid crystal display (LCD) subsystem serves as a module for the microprocessor to communicate infusion programming information and pump status to the user and facilitate the entry of data from the keypad. The LCD module displays two rows of 16 characters, with each character defined by a selection of dots from a 5 x 7 array with a cursor underneath the array.

The LCD module can be written to by the microprocessor which supplies it with either data or commands. Information in the LCD's memory is read by the microprocessor. For its functional operation, the LCD module has two memories; the character generator (CG) RAM and the display data (DD) RAM. The pump hardware has no need to distinguish between the two types of RAM. This is accomplished by the operating software in the microprocessor through the commands sent to the LCD module.

The backlight circuit provides power to the light emitting diodes (LEDs) inside the LCD module to generate the necessary light for reading the display. These LEDs consume a significant amount of power. Therefoere, when the pump is powered only by the 9-volt battery, the display is only lit when needed. The LEDs are driven at less than the nominal rated current. This provides a dim illumination of the display to reduce the drain on the battery. When programming the pump on battery power, the backlight will be on. Fifteen seconds after programming is complete, the backlight will turn off. The backlight will turn on again when any key is pressed.

When the pump is being powered by the AC Adapter, the LEDs are on all the time. The LEDs are supplied with nominal full rated current giving a bright backlight. As long as the AC Adapter is providing power, the display will remain lit.

Silent Shutdown Circuit

When both the AC Adapter and 9-volt battery have been accidentally or intentionally disconnected, the pump will notify the operator by issuing an intermittent “chirping” sound. The power supply provides a residual voltage which maintains power to the speaker circuit. Once this voltage has been depleted, the chirping will fade away (no less than 20 seconds).

Motor Subsystem

The motor subsystem has the ability to drive the DC motor in a forward or reverse direction. The pump drive is controlled by the Direction and Drive Motor Module (DDMM) which receives inputs from two independent shaft position encoders. The encoder information enables precise control over the motor and therefore the fluid delivery rate.

To drive the motor, the microprocessor provides motor drive information using one of two carrier frequencies. The DDMM uses a frequency discriminator to interrogate the carrier signal and set the polarity of the voltage to the motor. Once direction is established, the motor is controlled by the motor drive information directly from the microprocessor.

Occlusion Detection Circuit

A check is made for the possibility of blockage (occlusion) during the delivery downstream and upstream of the pump. (NOTE: Unless the upstream occlusion alarm is disabled in the pump's configuration.) During downstream occlusion, the elastic section of the tubing set (in the area where the fingers of the peristaltic pump operate) will expand slightly if a blockage exists. The expansion causes the deflection of a very sensitive sensor thereby enabling the pump to sense an occlusion. During upstream occlusion, the elastic section of the tubing set will contract slightly if a blockage exists upstream thereby changing the deflection of a second sensor, and allowing the pump to sense the occlusion. If the motor is operating in the reverse direction, as during the startup upstream occlusion test, an upstream blockage will cause a slight expansion of the tubing which allows the pump to sense the occlusion.

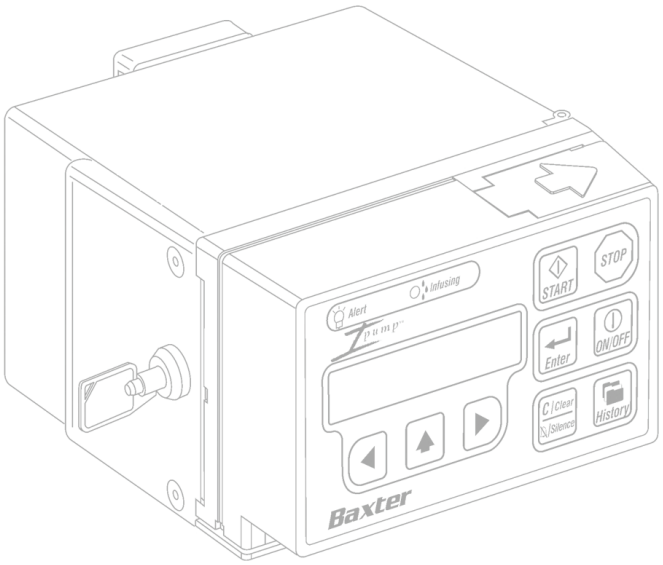
Air Sensor Circuit

An ultrasonic sensor is embedded in the plastic housing of the tubing door where the tubing set is placed. When an air bubble passes through the tubing, the pump will sense the different properties of fluid versus air and will issue an alarm when a certain amount of air passes through that section of tubing.

Printer Adapter Interface Circuit

The interface to the printer adapter enables the microprocessor to produce a printout of the history data. The pump interfaces with the Baxter Printer Adapter, P/N 2L3400, and a printer (typically a Seiko DPU-414). The printer interface is a serial port that operates on TTL levels and provides data at a 600 baud rate.

A label is normally used to cover the PRINTER/COMM connector at the front of the pump. This label should only be removed when the printer adapter is connected to the pump. A second label positioned nearby indicates that this connector is sensitive to Electrostatic Discharge (ESD).


Alert
Infusing
START
STOP
Enter
ON/OFF
Clear
Silence
History
Baxter

3 - Care & Routine Maintenance

In this section **Page**

Overview 3-1
Cleaning and Disinfecting 3-1

Overview

The **Ipump** device is designed to provide reliable service with only minor routine maintenance. A periodic functional inspection of the pump should be performed at least every six months to assure proper operation. The procedures in Chapter 5, “Functional Tests”, must be used to ensure that the pump operates properly. A review of the Alarm Log should also be performed to identify system errors encountered by the pump. Refer to Chapter 4, “Troubleshooting”, for details on reviewing the Alarm Log.

Baxter recommends performing preventive maintenance on an annual basis and cleaning after every use. For convenience, the pump can be configured to give the operator an alert whenever maintenance is due. Refer to the **Ipump** System Configuration Manual for details.

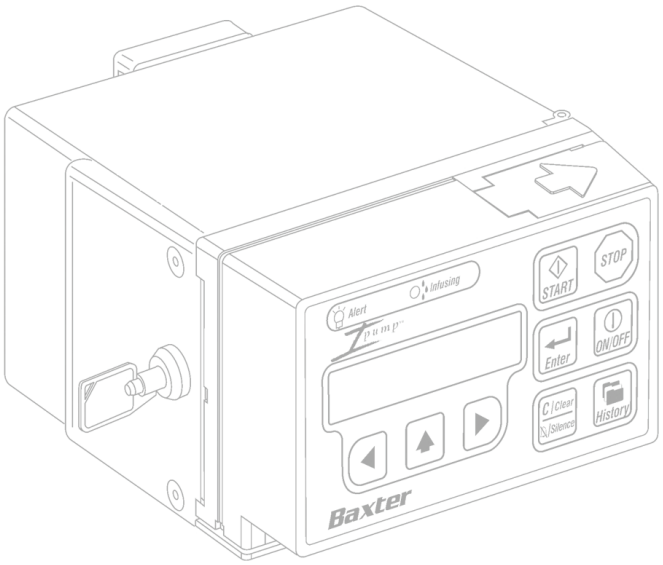
Cleaning and Disinfecting

The exterior surfaces of the pump may be cleaned with a cloth, sparingly dampened with any of the cleaners listed in the table below. Follow the manufacturer's instructions for diluting concentrated cleaners. After use, pumps should be cleaned/disinfected with an agent from the list below before being used on another patient. Spills and dirt should be cleaned off the pump as quickly as possible.

Recommended Cleaner	Manufacturer	Cleaner	Disinfectant
Soapy water	N/A	XXX	
A solution of 10% bleach and water	N/A	XXX	XXX
LpH	STERIS Corporation	XXX	XXX
Septisol	STERIS Corporation	XXX	XXX
Super-Edisonite	Colgate-Palmolive Co.	XXX	
TOR or Hi-TOR Plus	Huntington Professional Products	XXX	XXX

Table 3-1. Approved Cleaners and Disinfectants

CAUTION The **Ipump** device and the AC Adapter are not waterproof and should not be immersed. Avoid getting liquids inside the pump or permanent damage may result. Do not use alcohol for cleaning. Sterilization via ETO, steam, etc. should not be attempted.


Alert
Infusing
START
STOP
Enter
ON/OFF
Clear
Silence
History
Baxter

4 - Troubleshooting

In this section **Page**

Overview 4-1
Reviewing the Alarm Log 4-1
Troubleshooting 4-3
System Error Codes 4-5
- Range 10 - 2V -- Peripheral/Sensor Errors 4-5
- Range 30 - 47 -- Motor Control Errors 4-6
- Range 50 - 52 -- RTC Errors 4-7
- Range 60 - 62 -- Power Supply Errors 4-7
- Range 70 - 74 & L0 -- MPU Errors 4-7
- Range 75 - 8D -- Processing Errors 4-8
- Range 90 - 9Z & M0 - P3 -- Data Corruption Errors 4-8
- Range A0 - J1 -- Processing Errors 4-10

Overview

CAUTION Only trained, qualified personnel and Baxter authorized service representatives should perform procedures in this manual.

CAUTION Contact Baxter Healthcare Corporation to arrange any needed service support or if you have any questions while servicing the pump.

Pumps under warranty must be returned to the factory for repair. Unauthorized disassembly/repair will void your warranty. When a pump malfunctions, perform the following to see if pump operation can be restored. Ensure that the:

- batteries are installed and not depleted.
- batteries are installed correctly (proper polarity).

If this does not restore the pump operation, refer to the Troubleshooting Chart, Table 4-1.

! WARNING ! **The pump must only be serviced by a trained biomedical engineering technician or Baxter Healthcare personnel.**

Reviewing the Alarm Log

Troubleshooting an **Ipump** device should begin with a review of the alarm log. This section describes the steps involved for performing this review. For system errors identified in the alarm log review, refer to the System Error Codes Tables in this chapter to help determine the component or assembly that may be contributing to the failure.

1. Unlock the Bag Cover and press the **<ON/OFF>** key to turn the pump on. The Bag Cover must be open.
2. If the language option is "None," the display will read "PRESS ENTER FOR ENGLISH." The display will cycle through the choices. Press the **<ENTER>** key while the ENGLISH choice is being displayed.
3. If a language has been previously configured, the display will be blank and will automatically continue to the next step.
4. When the display reads "SOFTWARE VERSION XX.XX.XX," hold down the left arrow key until "TESTING MEMORY" is displayed. "TESTING MEMORY" will only be displayed momentarily followed by "CONFIGURATION XXXXX."
5. The display will then read "000 ENTER CONFIG CODE." Using the left, right and up arrow keys, input the code 2-1-5 and press the **<ENTER>** key.
6. Upon entry to the Configuration Set mode, the display will read "CONFIGURATION PRESS ENTER." DO NOT PRESS THE ENTER KEY AT THIS TIME.
7. Press the **<HISTORY>** key.
8. The display will read "ALARM LOG."
9. Press the right cursor key to display the first system alarm entry. Each system alarm log entry will be displayed as follows:

   SYSTEM ERROR XX
   MM/DD/YY HH:MMXM
10. Record all alarms and their associated dates and times.
11. Continue to press the right cursor key to display the next system alarm log entry. The display will eventually read "END OF ALARM LOG."

NOTE: If the Alarm Log is empty, the display will read "END OF ALARM LOG."

12. At the "END OF ALARM LOG" display, press the **<ENTER>** key. The pump will then display "CONFIGURATION PRESS ENTER." To clear the System Alarm Log, proceed to the next step. To retain the System Alarm Log, press the **<ON/OFF>** key to turn the pump off.
13. Press the **<CLEAR/SILENCE>** key. The display will read "RESET CONFIG?"
14. Choose NO and press the **<ENTER>** key. The display will read "CLEAR HISTORY?" (if there is a history).
15. Choose NO and press the **<ENTER>** key. The display will read "CLEAR ALARM LOG?"
16. Choose YES and press the **<ENTER>** key. The pump will clear the System Alarm Log and the display will momentarily read "ALARM LOG CLEARED."
17. When the display reads "CONFIGURATION PRESS ENTER," press the **<ON/OFF>** key to turn the pump off.

Troubleshooting

The information in this chapter is written for repair to the board or module level. Except for those items listed, circuit board components are not available from Baxter Healthcare. Refer to Chapter 6 for disassembly procedures and Chapter 9 for repair parts information.

Symptom	Possible Cause	Solution
No power (9V)	Dead/Contaminated 9-volt Battery.	Check/replace the 9-volt Battery.
	Broken battery leads.	Replace the Battery Contact Assembly.
	Battery installed with wrong polarity.	Remove and re-install the 9-volt Battery.
	Defective MPU Board.	Check for 9-volt line at J10 connector. If it is present, replace the MPU Board. If not, replace the battery contact assembly.
No power (AC) (No AC Plug icon)	Poor AC Adapter connection to pump.	Ensure that the red dots are aligned and the connector is plugged in fully.
	Defective AC Adapter.	Check the output of the AC Adapter for 10 VDC. Replace the AC Adapter.
	Defective AC Connector on the Front Case.	Replace the Front Case Assembly.
	Defective or disconnected AC Power Connector inside pump.	Check for proper installation of the AC power connector onto the MPU Board at J4. Replace the front case assembly.
	Defective MPU Board.	Check for 10 volts at connector J4. If present, replace the MPU Board. If not, replace the Front Case Assembly.
Constant audible alarm – no display when battery or AC Adapter plugged in	Defective MPU Board.	Replace the MPU Board.
No audio alarm	Defective Buzzer.	Replace the Buzzer.
	Defective MPU Board.	Replace the MPU Board.
Constant occlusion alarm	Damaged/disconnected wiring to Flex Cable.	Check wiring to the Flex Cable and resolder as necessary.
	Defective occlusion sensors.	Replace the Mechanism Assembly.
	Defective/damaged Flex Cable or connector on Mechanism Assembly.	Replace the Mechanism Assembly.
	Dirty or jammed Occlusion Sensors.	Clean the Occlusion Sensors on the Mechanism Assembly or replace the assembly.
	Defective/damaged J14 connector on MPU Board.	Replace the MPU Board.
	Defective MPU Board.	Replace the MPU Board.
No air alarm or constant	Defective Air Sensor.	Replace the Mechanism Assembly.
	Air Sensor Disabled.	Check the pump configuration.
Constant alarm, no LCD display when ON/OFF key pressed	Bent or broken pin on LCD Module.	Replace the LCD Module.
	Defective LCD Module.	Replace the LCD Module.
	Defective MPU Board.	Replace the MPU Board.

Table 4-1. Troubleshooting Chart

Symptom	Possible Cause	Solution
LCD not working or segments missing	Defective LCD Module.	Replace the LCD Module.
	Defective MPU Board.	Replace the MPU Board.
No backlighting	Poor connection between J23 and the LCD Module.	Check to ensure the backlight connector is properly installed (pins 15 & 16 of J23).
	Defective LCD Module.	Replace the LCD Module.
	Defective MPU Board.	Replace the MPU Board.
"Check Tubing Placement" screen will not clear	Tubing segment improperly installed or not installed.	Ensure the tubing set is installed properly. Refer to the operator's manual for proper installation.
	Dirty or disconnected Flex Cable Connector to J14 on MPU.	Clean and tighten the Flex Cable Connector.
	Defective Microswitch.	With a tubing segment properly installed, check continuity between pins 13 and 14 of the mechanism flex circuit connector (refer to connector pin-out in Figure 8-3). If the circuit remains "open," replace the Mechanism Assembly.
	Defective/damaged Flex Cable.	Replace the Mechanism Assembly.
	Defective MPU Board.	Replace the MPU Board.
"Cover Is Unlocked" alarm will not clear	Defective Reed Switch on Rear Case.	Replace the Rear Case Assembly.
	Disconnected Reed Switch.	Connect the Reed Switch Connector to the MPU Board.
	Missing Magnet (Bag Cover Latch).	Repair/replace the Bag Cover.
	Defective Lock Assembly.	Repair/replace the Bag Cover.
	Defective MPU Board.	Replace the MPU Board.
No input from front panel keypad	Defective Keypad.	With power removed, check the Keypad for continuity while pressing the suspected key (refer to the Keypad pin-out in Figure 8-2).
	Disconnected Keypad Connector.	Connect the Keypad Connector.
	Bad contact between Keypad Flex and MPU Board.	Check the connector pins and clean/repair as needed.
Will not retain memory	Low or dead 3V Backup Battery.	Replace the 3V Backup Battery. (Refer to the 3V Backup Battery Test in Chapter 6.)
	Defective MPU Board.	Replace the MPU Board.
Will not accept attempts/ injections from PCA switch	Defective PCA Cable.	Replace the PCA Cable.
	Defective PCA Connector on MPU Board.	Replace the MPU Board.
	Defective MPU Board.	Replace the MPU Board.
Will not print	Defective Printer Connector on MPU Board.	Check for bent Printer Connector pins. Replace the Printer Connector if necessary.
System Error 32	Loose Motor Connector.	Tighten the Motor Connector J2 on DDMM.
	Defective Motor.	Replace the Mechanism Assembly.
System Error 33	Defective/damaged Mechanism Assembly.	Replace the Mechanism Assembly.

Table 4-1. Troubleshooting Chart (Continued)

System Error Codes

NOTE: If an error code appears on the display, remove all power, then restart the pump. A problem is indicated if the error persists. Due to the fact that error codes shutdown the pump, it is difficult to troubleshoot without swapping out suspected assemblies. As all error codes are software generated, the MPU PCBA is always suspected.

The following tables contain a listing of all error codes that the pump can generate. This list is provided for reference purposes only.

Range 10 - 2V -- Peripheral/Sensor Errors

Failures specific to components external to the MPU such as switches or the EEPROM.

Code	Cause
10	key held, even after warning
11	display RAM failure, pattern 1
12	display RAM failure, pattern 2
13	character generator RAM failure
15	display is not responding expeditiously
16	red LED is not functioning
18	green LED is not functioning
19	EEPROM didn't ack write address command preceding read
1A	EEPROM didn't ack high address preceding read
1B	EEPROM didn't ack low address preceding read
1C	EEPROM didn't ack read command
1D	EEPROM didn't ack write address command preceding write
1E	EEPROM didn't ack high address preceding write
1F	EEPROM didn't ack low address preceding write
1G	EEPROM didn't ack send byte
1H	EEPROM didn't ack write address command within timeout
20	trying to read beyond end of EEPROM
21	trying to write beyond end of EEPROM
22	event log trying to write beyond end of EEPROM
23	system log trying to write beyond end of EEPROM
24	EEPROM read after write failure
25	(Not Used)
26	Rx data int, but Rx buffer is empty
27	error while printing history data
28	Tx could not send config data
29	Tx could not send config data after NAK

2A	Tx could not send memory dump data
2B	pump turned on by other than the on/off key
2C	CRC failure on internal ROM (8000-ffff)
2D	CRC failure on external ROM (20000-3ffff)
2E	external watchdog circuitry failure during reset test
2F	external watchdog circuitry failure during shutdown
2G	cat_fmt_str, string too long
2H	noise on sensor condition in start_air_sensor
2J	upstream occlusion sensor failure
2K	downstream occlusion sensor failure
2L	air percentage is greater than 100
2M	air to_percent macro, attempt to divide by 0
2N	Stuck downstream occlusion sensor
2V	Stuck upstream occlusion sensor

Range 30 - 47 -- Motor Control Errors

Failures specific to the control of the motor.

Code	Cause
30	no forward motion after several control intervals
31	motor runaway
32	can't reach desired speed
33	main encoder counts 25% over nominal value for one motor rev
34	main encoder counts 25% under nominal value for one motor rev
35	main encoder counts 3% over nominal value for 8 motor revs
36	main encoder counts 3% under nominal value for 8 motor revs
37	motor moving when it should be stopped
38	motor moving when it should be stopped
39	motor drive transistor failure
40	motor should be stopped, but it is backing up
41	motor should be going forward, but it is moving backwards
42	speed nearing mechanical limits
43	not stopping quickly enough
44	Invalid motor control state

45	Motor should be moving backwards, but it is moving forwards
46	Attempt to move motor backwards other than during Startup up occlusion test
47	Motor moving while attempting to change direction

Range 50 - 52 -- RTC Errors

Failures specific to real-time clock functionality.

Code	Cause
50	RTC vs. system clock comparison error
51	Time read back = time written
52	RTC RAM failure

Range 60 - 62 -- Power Supply Errors

Failures specific to power supply voltage checks.

Code	Cause
60	power supply voltage is out of range
61	no detectable power source
62	no detectable power source

Range 70 - 74 & L0 -- MPU Errors

Failures specific to the operation of the microprocessor such as the contents of a mode register being incorrect.

Code	Cause
70	a-d converter timeout in voltage check
71	a-d converter timeout in occlusion check
72	illegal interrupt
73	internal watchdog timeout
74	ROM check stack overflow error
L0	CPU test failed

Range 75 - 8D -- Processing Errors

Failures specific to abnormal processing conditions encountered during operation, such as a stack overflow, or a watchdog timeout.

Code	Cause
75	bus_count exceeds maximum limit
76	unknown event received by task
77	tried to remove total not in list
78	software timer out of range
79	B0_isr held off for more than 60ms.
80	stack overflow in BB check_stack()
81	BYTE-BOS stack overflow
82	operations task stack overflow
83	user interface stack overflow
84	serial monitor stack overflow
85	UIT message buffer overflow
86	stop_rx routine called when it should not have been
87	delivery attempt before delay elapsed
88	attempt to stop injection when no injection in progress
89	volume given not within +/- 0.5% during bolus
8A	volume given not within +/- 0.5% during PCA injection
8B	volume given not within +/- 0.5% during basal or continuous
8C	attempt to infuse at 0 rate
8D	BYTE-BOS failure, returned to main

Range 90 - 9Z & M0 - P3 -- Data Corruption Errors

Failures specific to Data Corruption Errors -- Error detected during testing of data validity.

Code	Cause
90	UIT invalid state during prime
91	UIT invalid state during bolus
92	UIT invalid state during display of SOT
93	UIT invalid state updating history attempts/injections
94	UIT invalid state displaying history total given
95	UIT invalid state displaying event history

96	UIT invalid state displaying held key info
97	UIT invalid state displaying system errors list
98	UIT invalid state while setting modes
99	UIT invalid state while setting units
9A	UIT invalid state while attempting to send replication data
9B	UIT invalid state at end of replication
9C	UIT invalid state found in auxil table
9D	invalid field requested in get_hist()
9E	invalid field requested in get_hist_time()
9F	history checksum failure, data corrupted
9G	invalid field requested in write_history()
9H	error in getting rx data units for printing
9J	0 concentration in rx data for printing
9K	error in getting rx data units for printing
9L	configuration checksum failure, data corrupt at startup
9M	configuration checksum failure, data corrupt in get_cf()
9N	configuration checksum failure, data corrupt in get_cf_string()
9P	rx checksum failure, data corrupted at get_rx_units()
9Q	rx checksum failure, data corrupted at get_rx_mode()
9R	rx checksum failure, data corrupted at get_rx()
9S	invalid field requested in argument to get_rx()
9T	invalid field requested in argument to set_rx()
9U	rx checksum failure, data corrupted at get_rx_all()
9V	cur_state is corrupt
9W	branch_state is corrupt
9X	sw_status is corrupt at soft_status()
9Y	sw_status is corrupt at set_soft_status()
9Z	pump_status is corrupt at check_status()
M0	pump_status is corrupt at set_status()
M1	pump_status is corrupt at clear_status()
M2	tot_entry list too long in add_entry()
M3	tot_entry list too long in rem_entry()
M4	tot_entry list too long in upd_totals()
M5	invalid address passed to calc_checksum()
M6	LCD line 1 string length too long
M7	LCD line 2 string length too long
M8	EEPROM read after write error in reset_event_log()

M9	EEPROM read after write error in reset_event_log()
N0	EEPROM read after write error in log_event()
N1	EEPROM read after write error in log_event()
N2	EEPROM read after write error in reset_syserr_log()
N3	EEPROM read after write error in reset_syserr_log()
N4	EEPROM read after write error in log_syserr()
N5	EEPROM read after write error in log_syserr()
N6	checksum error on get_next_event()
N8	checksum error on log_syserr()
N9	checksum error on get_next_syserr()
P0	checksum error on get_prev_syserr()
P2	checksum error on event log only in start_logs()
P2	checksum error on syserr log only in start_logs()
P3	checksum error on both logs in start_logs()

Range A0 - J1 -- Processing Errors

Failures specific to abnormal processing conditions encountered during operation - variable out of range.

Code	Cause
A0	invalid type passed to checkpump()
A1	invalid state in f329_init()
A2	invalid date format in f135()
A3	invalid cursor position in date set, proc12()
A4	invalid cursor position in date set, proc12()
A5	invalid cursor position in date set, proc12()
A6	invalid cursor position in time set, proc24()
A7	invalid cursor position in set_dt_display()
A8	invalid cursor position in set_dt_display()
A9	invalid cursor position in set_dt_display()
B0	invalid state in f234_enter()
B1	invalid state in f303_enter()
B2	invalid state in f304_enter()
B3	invalid state in f310_enter()
B4	invalid state in f319_init()
B5	invalid state in f320_init()

B6	invalid state in f325_init()
B7	invalid state in f324_init()
B8	invalid state in f330_init()
B9	invalid state in f334_init()
C0	invalid state in f334_init()
C1	invalid state in f335_init()
C2	invalid state in f335_enter()
C3	invalid state in f336_init()
C4	invalid state in f336_enter()
C5	invalid state in f337_enter()
C6	invalid state in f340_init()
C7	invalid state in f345_init()
C8	invalid state in f405()
C9	invalid state in f405_io()
D0	invalid reason to stop bolus
D1	illegal event f425()
D2	illegal dose limit type f615_init()
D3	illegal menu item in f730_enter()
D4	illegal menu item in f734_enter()
D5	illegal menu item in f740_enter()
D6	illegal menu item in f750_enter()
D7	illegal menu item in Build766Display()
D8	illegal menu item in f766()
D9	illegal menu item in Build770Display()
E0	illegal menu item in f770()
E1	illegal menu item in f810_enter()
E2	illegal event in proc_i()
E3	illegal event in io_proc_o()
E4	illegal event in io_proc_cur()
E5	illegal str_buf len in io_bcd_to_string()
E6	illegal str_buf len in io_bcd_to_string()
E7	illegal event in proc_menu()
E8	illegal event in proc_menu1()
E9	illegal event in proc_menu2()
F0	illegal event in proc_text()
F1	illegal unit type in get_unit_text()
F2	invalid LED request

F3	invalid audio request
F4	negative number passed to lrtoa()
F5	invalid unit for this print request
F6	decimal point precision out of range
F7	number too big in round_value()
F8	string too long to display
F9	precision too large in sprintg()
G0	unrecognized format in sprintg()
G1	string produced by cpystr() too long for display
G2	unknown timer in process_msg()
G3	unknown key in process_msg()
G4	invalid silence until time requested
G5	invalid config item requested at get_cf()
G6	invalid config item requested at get_cf_string()
G7	invalid config item requested at cf_cond()
G8	invalid config item requested at set_cf()
G9	invalid config item requested at set_cf_string()
H0	invalid timer_id in set_timer
H1	invalid timer_id in kill_timer
H2	invalid clock register requested
H3	variable out of range in hextobcd()
H4	invalid clock register requested in rtc_rd_time()
H5	variable out of range in bcdtohex()
H6	invalid month in days_in_month()
H7	invalid alert time in check_bag_volume()
H8	illegal menu item in restart pm cycle
H9	invalid unit for this print request
J0	invalid field width in 1toaw
J1	invalid field width in 1rtoaw

5 - Functional Tests

In this section **Page**

Overview 5-1
General Information 5-2
Equipment Required 5-3
Optional Equipment 5-3
Exterior Visual Inspection 5-3
Configuration Settings 5-4
Flow Rate Accuracy Test 5-6
Test Setup 5-7
Procedure Using the Gravimetric Method 5-7
Procedure Using the Volumetric Method 5-8
Downstream Occlusion Calibration Pressure Test 5-8
Operational Checks 5-9
Test Set Up 5-9
Power-On Self Test (POST) 5-9
Keypad Operation Test 5-10
Bag Cover Lock/Unlock Test 5-10
Tubing Sensor Test 5-10
Occlusion Sensor Test - Downstream 5-11
Occlusion Sensor Test - Upstream 5-11
Air Sensor Test 5-12
PCA Cable & Button Test 5-13
AC Adapter Test (Optional) 5-13
History Retention Test (Backup Battery Check) 5-14
Printer Test (Optional) 5-14
Unintended Shutdown Circuit Test 5-14
Functional Test Data Sheet 5-15

Overview

The pump design includes extensive self-tests which continually monitor the pump's operation. These checks occur during normal operation of the pump. When an alarm or fault condition is detected, the pump generates an error message, flashing LED indicators and/or an audible alarm. These indicators warn the user of the detected fault. The pump will stop operating until the fault condition has been corrected.

The test procedures in this chapter ensure that the pump operates properly. It is recommended that anyone performing these functional tests become familiar with the

pump operating procedures contained in the **Ipump** Pain Management System Operator's Manual. To properly perform these tests, the pump must be reset to the specific configuration settings provided in the procedure on page 5-4.

Pumps that fail any of the tests in this chapter are to be repaired using the information provided in Chapter 4, "Troubleshooting" and Chapter 6, "Disassembly & Reassembly", or returned to a Baxter Service Center for repair. Before returning the pump for repair, record the failure mode and the pump's setup prior to and during the failure. Call a Baxter representative for a Service Authorization Number and the procedure for returning a pump for repair.

It is recommended that the results of the functional tests in this chapter be recorded on a copy of the Functional Test Data Sheet provided at the end of this chapter. A copy of the Functional Test Data Sheet should be kept as a preventive maintenance record for each pump.

General Information

The following notes provide nice-to-know information about conditions which could occur during the procedures provided in this chapter.

NOTE: In the procedures that follow, keystroke requirements are shown enclosed within brackets. Example: **<ENTER>**. (This does not apply to prescription entries.)

NOTE: If the pump alarm activates, press **<CLEAR/SILENCE>** to silence the alarm.

NOTE: The pump will alarm if left in programming mode for longer than 3 minutes.

NOTE: Press **<ENTER>** to return to the "ENTER CODE" screen and resume a procedure from the previous code entry step.

NOTE: The pump display goes blank when the pump is on battery power and the keypad is inactive for more than approximately 15 seconds. Press any key to restore the previous screen.

NOTE: The 9-volt battery icon is present in the upper right-hand corner of the display when a 9-volt battery is installed in the pump.

NOTE: Press **<ON/OFF>** once to power on the pump.

NOTE: Press **<ON/OFF>** twice to power off the pump. (The current prescription data will be erased from the pump programming options, but will be retained in History.)

NOTE: If **<ON/OFF>** is pressed too rapidly, the pump may not detect the second press.

NOTE: To stop priming or an infusion press **<STOP>** twice within one second.

NOTE: If **<STOP>** is pressed too rapidly, the pump may not detect the second press.

NOTE: During the test procedures, record all applicable information on the Functional Test Data Sheet.

Equipment Required

- Pump with a fresh 9-volt battery installed
- PCA Cable (refer to the table on page 1-2)
- Empty tubing set (see Operator's Manual)
- Syringe, 60 cc (or equivalent) with Luer lock connection (see Operator's Manual)
- Magnet (small enough to fit into the Rear Case Latch)
- Distilled water
- (2) 250 mL bags - one filled with fluid (see Operator's Manual)
- Fluid-filled tubing set - with fluid-filled bags
- Slide clamp or equivalent
- Stopwatch or timer (minutes and seconds)
- Fluid pressure gauge (minimum range 0 to 30 psi)
- Scale with minimum of two decimal place gram readout (for use with gravimetric test)
- 20 mL minimum burette (Recommended: ASTM class A burette with 0.2 mL graduation resolution or better.)

Optional Equipment

- AC Adapter (2L3210)
- Printer Adapter (2L3400), Printer Adapter Cable (2L3402), and printer

Exterior Visual Inspection

The pump should be inspected for the parameters listed below. Upon completion of this inspection, check off PASS or FAIL on the Functional Test Data Sheet, and record any pertinent comments. If the pump fails any of these inspections, ensure that the applicable service is performed on the pump before it is made available for patient use.

1. **Pump Case** - Verify that the Pump Case is free of visible damage and free of any indication of fluid ingress.
2. **Bag Cover** - Verify that the Bag Cover is properly positioned and secured to the pump. Verify that it opens and closes freely and without binding.
3. **Bag Cover Lock** - Verify that the Bag Cover Lock turns freely when locking and unlocking the cover. (Align the Bag Cover with the pump and hold closed. Push the key into the lock before turning it.)
4. **Battery Door** - Verify that the Battery Door operates freely and closes securely when a battery is in place.
5. **Keypad** - Verify that the entire Keypad is secured to the case and is not lifting up at the edges. Ensure that the Keypad is free of damage.
6. **Tubing Door** - Verify that the Tubing Door opens freely and that the latching mechanism operates properly when the door is closed.
7. **Pumping Fingers** - Verify that the pumping fingers are not loose or missing.
8. **Tube Pathway** - Ensure that the pathway is clean and clear of any obstructions.

9. **Labels** - Verify the presence of the following labels:
   - PRINTER/COMM Connector Cover label (under the Front Case)
   - Electrostatic Discharge (ESD) Warning label (under the Front Case)
   - Rear label (on the Rear Case)
   - Serial Number label (on the Rear Case)
   - Battery Polarity label (inside the Battery Compartment)

Configuration Settings

Prior to performing the test procedures in this chapter, the pump must be reconfigured to the specific settings provided in the following procedure. Perform the steps that follow:

1. Make sure the 9-volt battery is inserted properly or connect the optional AC adapter.
2. Unlock the Bag Cover.
3. Press the **<ON/OFF>** key. The display reads:

   ```
   PERFORMING POWER
   ON SELF TESTS
   ```

   then moves to:

   ```
   PRESS ENTER FOR
   ↑ ENGLISH
   ```

   and the display scrolls through the operational languages available in the pump. (If the display goes blank, press any key to restore the display.)
4. When the desired language is displayed, press the **<ENTER>** key. The display reads:

   ```
   SOFTWARE VERSION
                X.XX.XX
   ```

5. Press and hold down the ◀ key. A continuous beeping sound will be heard, and the display automatically proceeds through the following screens:

   ```
   TESTING
   MEMORY
   ```

   and:

   ```
   CONFIGURATION
       XXXXX
   ```

NOTE: If these screens fail to appear, the pump has not entered the Configuration Mode. Press **<ON/OFF>** twice to turn the pump off, then start again at Step 3 above.

6. Release the ◀ key. The beeping sound will stop. The display reads:

```
000 ENTER
↑    CONFIG CODE
```

7. Use the ◀ or ▶ key to move from column to column and the ▲ key to enter **215**, then press the **<ENTER>** key to enter the Configuration Set Mode. The display reads:

```
CONFIGURATION
PRESS ENTER
```

8. Press the **<ENTER>** key. The display reads:

```
RESET CONFIG?
↑       NO
```

9. Use the ▲ key to move between NO and YES. When YES is shown on the display, press the **<ENTER>** key. The display reads:

```
SETTING DEFAULT
CONFIGURATION
```

then moves to:

```
CLEAR ALARM LOG?
↑         NO
```

10. Use the ▲ key to move between NO and YES. When YES is shown on the display, press the **<ENTER>** key. The display reads:

```
CONFIGURATION
PRESS ENTER
```

11. Press the **<ENTER>** key, then press the ▲ key one time so the display reads:

```
SELECT GROUP:
↑ LIMITS
```

12. Press the **<ENTER>** key five times, with a pause between each press for the display information to change, until the display reads:

```
XX.X mL/hr MAX
↑     BASAL RATE
```

13. Use the ◀ or ▶ key to move from column to column and the ▲ key to enter **15.0** mL/hr as the Maximum Basal Rate, then press the <**ENTER**> key three times. The display reads:

```
SAVING
LIMITS
```

then returns to:

```
SELECT GROUP:
↑ LIMITS
```

14. Press the ▲ key one time so the display reads:

```
SELECT GROUP:
↑ CONTROLS
```

15. Press the <**ENTER**> key seven times until the display reads:

```
AIR DETECTION
↑ OFF
```

16. Press the ▲ key once so the display changes from **"OFF"** to **"LOW"**, then press the <**ENTER**> key. The display reads:

```
SAVING
CONTROLS
```

then returns to:

```
SELECT GROUP:
↑ CONTROLS
```

17. Press the <**ENTER**> key twice to turn the pump off. The pump is now reconfigured to the Factory Default settings except for the Maximum Basal Rate which is set to 15.0 mL/hr, and the Air Detection feature which is set to LOW.

NOTE: To reconfigure the pump for the operational features selected by your institution, follow the steps in the **Ipump** Pain Management System Configuration Manual.

Flow Rate Accuracy Test

The following procedure should be used to verify the flow rate accuracy of the pump. The performance of commercially available automated rate testing equipment has not been evaluated by Baxter for use on the **Ipump** device.

NOTE: Both a Gravimetric Method and a Volumetric Method of measurement have been provided. The performance of either method is acceptable. Record all appropriate information on the Functional Test Data Sheet.

Test Setup

1. Use a syringe to fill a fluid bag with a minimum of 100 mL of distilled water.
2. Remove all the air from the fluid bag, then cap it.
3. Install the tubing set into the pump.
4. Uncap the fluid bag and attach it to the tubing set.
5. Install the bag into the pump's Bag Cover, close and lock the Bag Cover.
6. Turn on the pump and program it as follows:

   Mode = Continuous
   Units = mL
   Bag volume = 100 mL
7. Prime the pump until all the air is removed from the tubing set and fluid bag.

NOTE: Use either the Gravimetric Method or the Volumetric Method to determine the flow rate accuracy of the pump.

Procedure Using the Gravimetric Method

1. Set the scale to read in grams.
2. Attach the distal end of the tubing set to an empty 250 mL bag (output bag).
3. Deliver two additional priming volumes to ensure flow to the output bag.
4. Disconnect the output bag, cap it, weigh it, and record this as the "start weight" on the Functional Test Data Sheet. After recording the start weight, reconnect the output bag to the tubing set.
5. Complete the pump program as follows:

   Rate = 9.9 mL/h
   Bolus = 00.0 mL
6. Press the **<START>** key and observe the message **"TESTING UP OCCLUSION"**. Start the stopwatch as soon as the display reads **"CONTINUOUS 9.9 mL/hr"**.
7. Run the pump for at least 1 hour (but no more than 2 hours), then simultaneously unlock the bag cover and stop the stopwatch. Shut the pump off.
8. Disconnect the output bag, cap it, and weigh it. Record this weight as the "end weight".
9. Record the stopwatch reading in seconds.
10. Use the following formulas to calculate the rate error:

$$Test\ Rate\ \left(\frac{mL}{hr}\right) = \frac{(End\ Weight) - (Start\ Weight)}{(Elapsed\ Time)(\text{sec})} \times 3600$$

$$Rate\ Error\ (\%) = \frac{9.9 - Test\ Rate}{9.9} \times 100$$

11. Record the test rate and the rate error on the Functional Test Data Sheet.
12. If the rate error is equal to or less than 8%, the pump passes this test. Otherwise, the pump fails. Record the results on the Functional Test Data Sheet.

Procedure Using the Volumetric Method

1. Attach the distal end of the tubing set to a 25 mL burette.
2. Deliver two additional priming volumes to ensure flow to the burette.
3. Record the volume reading on the burette as the "start volume" on the Data Sheet.
4. Complete the pump program as follows:

   Rate = 9.9 mL/h
   Bolus = 00.0 mL
5. Press the **<START>** key and start the stopwatch as soon as the display reads **"CONTINUOUS 9.9 mL/hr"**.
6. Run the pump for at least 1 hour (but no more than 2 hours), then simultaneously unlock the bag cover and stop the stopwatch. Shut the pump off.
7. Record the volume reading on the burette as the "end volume".
8. Record the stopwatch reading in seconds.
9. Use the following formulas to calculate the rate error:

$$Test\ Rate\ \left(\frac{mL}{hr}\right) = \frac{(End\ Volume) - (Start\ Volume)}{(Elapsed\ Time)(\text{sec})} \times 3600$$

$$Rate\ Error\ (\%) = \frac{9.9 - Test\ Rate}{9.9} \times 100$$

10. Record the test rate and the rate error on the Functional Test Data Sheet.
11. If the rate error is equal to or less than 8%, the pump passes this test. Otherwise, the pump fails. Record the results on the Functional Test Data Sheet.

Downstream Occlusion Calibration Pressure Test

1. Close-up the pump and install a fluid-filled tubing set into the pump.
2. Connect the set to a pressure gauge with a minimum range of 0 to 30 psi.
3. Program the Pump as follows:
   - Mode = PCA
   - Units = mL
   - Set fluid volume = 0100 mL

4. Program the Pump as follows:
   - PCA DOSE = 1.0 mL
   - DELAY = 3 minutes
   - 1 HR LIMIT = 10.0 mL
   - BOLUS = 05.0 mL
5. Start the bolus infusion and let the pump run until it goes into a downstream occlusion alarm.
6. Observe the Occlusion Pressure value and record the reading on the Functional Test Data Sheet.
   - If the reading is 22 ±10 psi, the pump passes this test.

Operational Checks

This series of tests checks the following pump features: Power On Self Test (POST), Keypad, Bag Cover Lock, Tubing Sensor, Occlusion Sensors, Air Sensor, PCA Cable & Button, AC Adapter (optional), history retention, printer port (optional), and unintended shutdown circuit. These tests are designed to be performed in one continuous sequence. Record the results of each test on a copy of the Functional Test Data Sheet located at the end of this chapter.

Test Set Up

1. Ensure a 9-volt battery is installed in the pump.
2. Remove any tubing set from the pump.
3. Plug the PCA cable into the pump.
4. Plug the AC Adapter into the pump (optional).

Power-On Self Test (POST)

NOTE: Read the entire POST process before proceeding.

1. Press the <**ON/OFF**> key to turn the pump on.
2. Verify that the following events occur:

- If the AC Adapter is plugged into the pump, the backlight will illuminate.
- The pump beeps once initially. The red Alert and green Infusing LEDs turn on.
- All LCD segments momentarily light up as 2 rows of rectangular test pattern segments. The Alert and Infusing LEDs flash at a rapid rate.
- **“PERFORMING POWER ON SELF TESTS”** is displayed. The Alert and Infusing LEDs continue to flash at a rapid rate.
- If the language setting option is NONE, the pump will display **“PRESS ENTER FOR ENGLISH”** and will scroll through the choices. When **“ENGLISH”** is displayed, press the <**ENTER**> key. (You may also press the ⬆ key to scroll to **“ENGLISH”**, then press the <**ENTER**> key.)

- **"SOFTWARE VERSION XX.XX.XX"** is displayed (where XX.XX.XX is the current version) as the pump sounds a stutter beep. The Alert LED is flashing at an approximately one-second interval. The Infusing LED is off.
- The ID label will be displayed if previously configured.
- The Date and Time will appear on the display followed by **"ENTER OR CLEAR."**
  a. If the date and time are correct, press the **<ENTER>** key.
  b. If not, press the **<CLEAR>** key and correct the Date and Time, then press the **<ENTER>** key.
- **"UNLOCK THE COVER"** is displayed.

3. Record the results on the Functional Test Data Sheet.

Keypad Operation Test

1. Press each key on the keypad. Verify that the pump beeps three times after each key press.

NOTE: The beeps following the ON/OFF and STOP keys will be delayed one second. DO NOT PRESS the ON/OFF key twice as this will turn off the pump.

2. Record the results on the Functional Test Data Sheet.

Bag Cover Lock/Unlock Test

1. Unlock the Bag Cover.
2. The pump will go into alarm and display **"LOCK THE COVER"**.
3. Lock the Bag Cover.
4. The display will read **"000 ENTER CODE"**. Unlock the Bag Cover one more time.
5. The pump will go into alarm and display **"COVER IS UNLOCKED"**.
6. Lock the Bag Cover.
7. Record the results on the Functional Test Data Sheet.

Tubing Sensor Test

1. Press the **<ENTER>** key and continue through the settings to program the pump as follows:

   Mode = BASAL + PCA
   Units = mL
   Bag volume = 100 mL

2. At the **"START TO PRIME, ENTER TO PROCEED"** screen, press the <**START**> key.
3. The screen will display **"CHECK TUBING PLACEMENT"**, the red LED will flash, and the audible alarm will sound. If so, the pump passes this test. (The **CLEAR/ SILENCE** key may be pressed to silence the alarm.) Record the results on the Functional Test Data Sheet.

Occlusion Sensor Test - Downstream

1. Unlock the Bag Cover.
2. The screen will display **"COVER IS UNLOCKED"**, the red LED will flash and the audible alarm will sound. (The **CLEAR/SILENCE** key may be pressed to silence the alarm.)
3. Open the Bag Cover, open the Tubing Door, install a primed tubing set into the pump, then close the Tubing Door.
4. Close and lock the Bag Cover. The security code screen will appear. Enter the security code (123) and press the **<ENTER>** key.
5. Program the pump as follows:

   Mode = BASAL + PCA
   Units = mL
   Bag volume = 100 mL
6. At the **"START TO PRIME, ENTER TO PROCEED"** screen, press the **<ENTER>** key.
7. Program the pump as follows:

   PCA dose = 1.0 mL
   Delay = 3 minutes
   Basal rate = 5.0 mL/h
   1 Hr. limit = 20.0 mL
   Bolus = 1.0 mL
8. At the "**START BEGINS RX, ENTER REVIEWS RX**" screen, press the <**START**> key. The pump will display, **"TESTING UP OCCLUSION"** while the pump performs the startup upstream occlusion test.
9. When the display reads, **"BOLUS INFUSING XX.X"**, clamp the distal (downstream) end of the tubing set within approximately 3 inches of the pump. After a short period, the display will read, **"DOWNSTREAM OCCLUSION",** the red LED will flash and the audible alarm will sound. If so, the pump passes the test. If not, check that the tubing set is properly clamped and, if necessary, repeat this test.
10. Record the results on the Functional Test Data Sheet.

Occlusion Sensor Test - Upstream

NOTE: Since the pump is currently configured with Factory Default settings, the upstream occlusion detection feature is ON.

1. Unlock the Bag Cover.
2. The screen will display **"COVER IS UNLOCKED"**, the red LED will flash, and the audible alarm will sound. (The **CLEAR/SILENCE** key may be pressed to silence the alarm.)
3. Open the Bag Cover, open the Tubing Door and make sure the tubing set is fully primed. Manual priming is preferred. After the set is primed, close the Tubing Door.
4. Place a slide clamp on the solution bag outlet to occlude the line.

5. Close and lock the Bag Cover. The security code screen will appear. Enter the security code (123) and press the **<ENTER>** key.
6. Program the pump as follows:

   Mode = BASAL + PCA
   Units = mL
   Bag volume = 100 mL
7. At the **"START TO PRIME, ENTER TO PROCEED"** screen, press the **<ENTER>** key.
8. Program the pump as follows:

   PCA dose = 1.0 mL
   Delay = 3 minutes
   Basal rate = 5.0 mL/h
   Hr. limit = 20.0 mL
   Bolus = 1.0 mL
9. At the **"START BEGINS RX, ENTER REVIEWS RX"** screen, press the <**START**> key. **"TESTING UP OCCLUSION"** is displayed while the pump performs an upstream occlusion test. Verify that the pump goes into an audible alarm and the display reads **"UPSTREAM OCCLUSION"**.

NOTE: The pump may go into therapy prior to detecting the occlusion. But the occlusion should be detected prior to 0.5 mL of fluid delivery.

10. Record the results on the Functional Test Data Sheet.

Air Sensor Test

NOTE: The pump is currently configured with Factory Default settings and with the air detection feature set to LOW so this test can be performed.

NOTE: This procedure is written to run after the Upstream Occlusion test **without** powering off the pump. If power is cycled or the Tubing Door is opened prior to this procedure, the user must ensure the IV set is primed and that the startup upstream occlusion test has been successfully completed prior to continuing.

1. Unlock the Bag Cover.
2. The screen will display **"COVER IS UNLOCKED"**, the red LED will flash, and the audible alarm will sound. (The **CLEAR/SILENCE** key may be pressed to silence the alarm.)
3. Without opening the Tubing Door, open the Bag Cover, clamp the solution bag, and disconnect it from the tubing set.
4. Close and lock the Bag Cover. The security code screen will appear. Enter the security code (123) and press the **<ENTER>** key.
5. Program the pump as follows:

   Mode = BASAL + PCA
   Units = mL
   Bag volume = 100 mL
   PCA dose = 1.0 mL

Delay = 3 minutes
Basal rate = 5.0 mL/h
1 Hr. limit = 20.0 mL
Bolus = 2.0 mL

6. Press the <**START**> key to begin the bolus and monitor the volume infused on the display. Verify that the pump goes into an audible alarm, with the display reading **"AIR IN TUBING."** Record the results on the Functional Test Data Sheet.

PCA Cable & Button Test

NOTE: Since the pump is currently configured with Factory Default settings, the PCA Button REQUIRED feature is ON.

1. Unlock the Bag Cover.
2. The screen will display **"COVER IS UNLOCKED"**, the red LED will flash, and the audible alarm will sound. (The **CLEAR/SILENCE** key may be pressed to silence the alarm.)
3. Open the Bag Cover and the Tubing Door, and remove the tubing set from the pump. Connect the tubing set to the bag, remove the clamp from the bag, and manually prime the tubing set.
4. Reinstall the tubing set into the pump.
5. Close and lock the Bag Cover. The security code screen will appear. Enter the security code (123) and press the <**ENTER**> key.
6. Program the pump as follows:

   PCA dose = 1.0 mL
   Delay = 3 minutes
   Basal rate = 5.0 mL/H
   1 Hr. limit = 20.0 mL
   Bolus = 00.0 mL

7. Press the <**START**> key. The display will read **"TESTING UP OCCLUSION"** followed by **"BASAL + PCA"** and the green LED will flash.
8. Wait a minimum of 3 minutes then press the PCA button 4 times. The pump will beep each time the PCA button is pressed.
9. Unplug the PCA cable from the pump. The screen will display **"PCA BUTTON NOT CONNECTED"**, both LEDs will flash, and the audible alarm will sound.
10. Re-insert the PCA cable into the pump. The screen will display **"BASAL + PCA"**, the green LED will flash, and the audible alarm will be off.
11. If all the observations in steps 8, 9 and 10 have occurred, the pump passes this test. Record the results on the Functional Test Data Sheet.

AC Adapter Test (Optional)

1. If present, disconnect the AC Adapter from the pump. The backlight will turn off and after approximately 2 seconds, the pump will sound a stutter beep and the icon in the upper right hand corner of the display will change to the battery symbol.

2. Re-connect the AC Adapter into the pump. The backlight will turn on and the displayed icon will change to the plug symbol.
3. If all the observations in steps 1 and 2 have occurred, the pump passes this test. Record the results on the Functional Test Data Sheet.

History Retention Test (Backup Battery Check)

1. Press the **<ON/OFF>** key to turn the pump off. Unplug the AC Adapter (if present) and remove the 9-volt battery. After approximately 1 minute, re-insert the 9-volt battery and the AC Adapter (if present) and turn the pump on.
2. Scroll through the history screens as described in the **Ipump** Pain Management System Operator's Manual. Verify that the prescription is correct and that the INJ/ATT screen indicates 1 INJ 4 ATT.
3. If the history screens are accurate, the pump passes this test. Record the results on the Functional Test Data Sheet.

Printer Test (Optional)

To perform this test, it will be necessary to remove the label covering the printer port connector at the front of the pump. After this test, replace the label over the printer port connector.

1. Connect the Printer Adapter to the printer.
2. Insert the Printer Cable to the Printer Adapter and the pump printer connector.
3. Turn on the printer.
4. Ensure that the active light is illuminated on the Printer Adapter.
5. Press the **<PRINT/STOP>** key on the Printer Adapter.
6. Verify that the pump provides a history printout.
7. If the printout is accurate, the pump passes this test.
8. Replace the label over the printer port connector. Record the results on the Functional Test Data Sheet.

Unintended Shutdown Circuit Test

1. Remove the 9-volt battery.
2. Ensure that the pump "chirps" and the red Alert LED flashes.
3. Press the **<CLEAR/SILENCE>** key and ensure that the LED stops flashing and the chirping is silenced.
4. Reinstall the 9-volt battery, ensuring that proper battery polarity is observed.
5. Record the results on the Functional Test Data Sheet.

Operatonal Checks are now complete. Ensure the Functional Test Data Sheet is properly reviewed and signed.

Functional Test Data Sheet

Record the results of the **Ipump** device functional tests on this Data Sheet. This sheet may be reproduced. Pumps that fail any of these tests must be serviced before being put into use.

Pump S/N: _____HARDWARE REV:_____ SOFTWARE REV:_____

VISUAL INSPECTION		
PASS	**FAIL**	**COMMENTS**

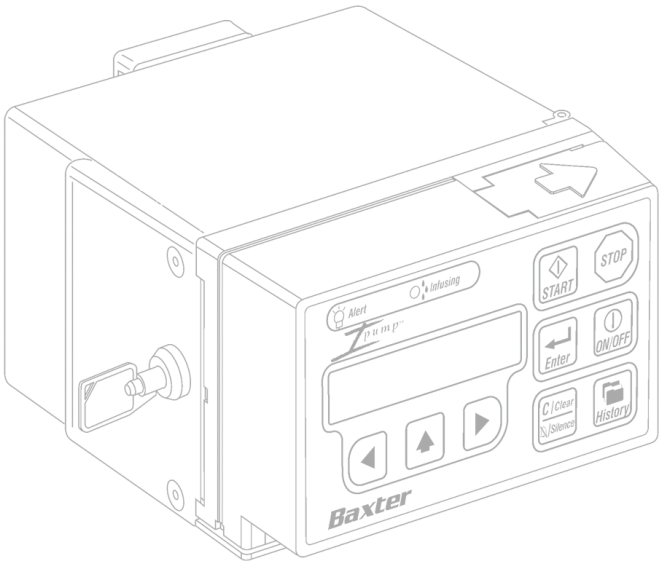
FLOW RATE ACCURACY TEST						
Gravimetric Method						
Start Weight	**End Weight**	**Elapsed Time**	**Test Rate**	**Rate Error**	**Results**	
					PASS	**FAIL**
Volumetric Method						
Start Volume	**End Volume**	**Elapsed Time**	**Test Rate**	**Rate Error**	**Results**	
					PASS	**FAIL**
Comments:						

DOWNSTREAM OCCLUSION CALIBRATION PRESSURE TEST		
PASS	**FAIL**	**OCCLUSION PRESSURE**

OPERATIONAL CHECKS			
Feature	**Test Results**		**Comments**
	PASS	**FAIL**	
Power-On Self Test (POST)			
Keypad Operation Test			
Bag Cover Lock/Unlock Test			
Tubing Sensor Test			
Occlusion Sensor Test - Downstream			
Occlusion Sensor Test - Upstream			
Air Sensor Test			
PCA Cable & Button Test			
AC Adapter Test (Optional)			
History Retention Test			
Printer Test (Optional)			
Unintended Shutdown Circuit Test			

Signature: _____ Date: _____

Reviewed by: _____ Date: _____


Alert
Infusing
START
STOP
Enter
ON/OFF
Clear
Silence
History
Baxter

6 - Disassembly & Reassembly

In this section

	Page
Overview	6-2
Tools & Materials	6-2
Required Tools & Equipment	6-2
Consumable Materials	6-3
Baxter-Created Tools & Equipment	6-3
Disassembly Procedures	6-4
General Disassembly Information	6-4
Bag Cover Assembly Removal	6-4
MPU PCBA Handling Guidelines	6-5
Rear Case Assembly Removal	6-6
Mechanism Assembly, DDMM PCBA, & Battery Wall Removal	6-7
MPU PCBA Removal	6-8
ESD Flex Circuit Removal	6-9
LCD Module Removal	6-10
Optional Procedures	6-11
3V Backup Battery Replacement	6-11
Initializing the 3V Backup Battery	6-12
Keypad Replacement	6-12
Assembly Procedures	6-15
Torque Specifications	6-15
Installing the Front Case & Keypad Assembly	6-15
Installing the ESD Flex Circuit	6-15
Installing the Display ESD Shield	6-18
Installing the LCD Module	6-18
MPU PCBA Handling Guidelines	6-19
Installing the MPU PCBA	6-19
Installing the Battery Wall & DDMM PCBA	6-23
Installing the DDMM PCBA Hold-down Foam	6-24
Installing the Mechanism Assembly	6-24
Installing the Battery Door	6-25
Pump Calibration	6-25
Internal Inspection	6-26
Closing the Case	6-27
Pump Functional Tests	6-28
Optional Assembly Procedures	6-28
Installing the Bag Cover Assembly	6-28

Overview

This chapter of the manual contains procedures to assist in the disassembly and reassembly of the pump and the removal and replacement of parts and assemblies. It is highly recommended that the procedures provided in this chapter be used whenever disassembly and repair is required.

For most assemblies and unique parts, specific reassembly procedures are provided. In some cases, there is only the need to reverse the steps used for the disassembly procedure.

Torque values for fasteners are provided where needed.

In some procedures, special tools or equipment may be required if disassembly continues past a certain point. Information about these special needs is included with the appropriate procedures.

Additional information, such as exploded view drawings and their associated parts lists, is contained in Chapter 9 and may be of assistance during these procedures.

CAUTION Only qualified, Baxter-trained personnel should attempt to repair the pump.

CAUTION It is strongly recommended that the pump be serviced in a static-free environment. When performing any repairs on the pump, exercise extreme caution to protect the circuit boards from static discharge. The inspection or repair station, all equipment, and personnel should be properly grounded.

CAUTION After the pump is completely reassembled, perform the Functional Test Procedures provided in Chapter 5 of this manual.

Tools & Materials

Required Tools & Equipment

The following tools are recommended for use in maintaining and repairing the pump. The repair procedures in this chapter assume these tools or their equivalent are available.

Required Tool	Required Tool
Soldering station (use small tip and keep temperature low to prevent damage to PCB pads)	Digital Multi-Meter (DMM) capable of reading Resistance and Voltage.
3/16" Hex Nut driver (with an outer diameter less than 0.26”) or equivalent	Test leads (small - must include mini-clips on both ends)
Flat Blade Screwdriver	Magnifying system, 3x eye piece or equivalent
Phillips Screwdriver - #1	Potentiometer Adjustment Tool
Scale (Minimum resolution of two decimal place gram readout)	Pressure Gauge (PG-2000 - minimum range of 0 - 50 psi)
Torque Screwdriver (22 - 28 in-oz)	Stop Watch or Timer
Needle-Nose Pliers	Wire Cutters

Table 6-1. Required Tools & Equipment

Consumable Materials

The following consumable items are used where called out in the repair procedures in this chapter. You may order these materials from Baxter.

Consumable Item	Purpose
Small Applicator Swabs (foam or cotton)	For applying lubricants and adhesives
Syringe (60cc) with Luer Lock Connector	For pump testing and calibration
Fluid-filled Tubing Set (with fluid-filled bag)	For pump testing and calibration
Empty Tubing Set (optional: pumping segment)	For pump testing and calibration
250 mL Fluid Bags (Qty 2)	For pump testing and calibration
Slide Clamp or Equivalent	For pump testing and calibration
Permabond 792	For mounting the Keypad Spacer
Loctite 425	General Mounting adhesive
GLPT Red Insulating Varnish (p/n 109002)	Electrical Insulating Material
Nyogel 760G	Flex Circuit contact preservative (Do Not Use on Keypad Flex Cable!)
Solder	For electrical connections
Flux Paste	For electrical connections
Isopropyl Alcohol	Adhesive remover
9-volt Battery	For operating pump as required
3M/Scotch Filament Tape 898	To place around the Backup Battery as needed
Black Permanent Marker	To mark guiding lines during parts replacement
Paper Towels	To wipe up spills or excess lubricants

Table 6-2. Consumable Materials

Baxter-Created Tools & Equipment

The following tools and equipment are required for the proper assembly or adjusting the pump mechanics. These are available from Baxter.

Part Number	Description
AS3AL4002	**Ipump** Calibration Gauge
B069290000	**Ipump** High Point Upstream Calibration Gauge
B069290001	**Ipump** Low Point Upstream Calibration Gauge
2L3400	Printer Adapter
2L3402	Printer Adapter Cable
2L3510	Anti-Siphon Set

Table 6-3. Baxter-created Tools & Equipment

Disassembly Procedures

General Disassembly Information

- The MPU Printed Circuit Board Assembly (PCBA) consists of 3 interconnected circuit boards referred to as the “Primary PCB”, “Secondary PCB”, and the “Connector PCB”.
- The Daughter PCBA is also referred to as the DDMM PCBA.
- Numbers in parentheses refer to the numbered parts in the drawing associated with the procedure.

NOTE: Prior to disassembly, remove all accessories and batteries.

NOTE: During disassembly or movement of the MPU PCBA and flexes, follow the MPU PCBA Handling Guidelines provided (refer to Figure 6-2).

NOTE: During disassembly, note the orientation and routing of all cables and connectors. Failure to do so may result in improper operation and/or damage to the pump upon reassembly.

NOTE: During disassembly, keep track of all hardware and avoid leaving loose hardware in the pump upon reassembly. Failure to do so may result in improper operation and/or electrical damage to the circuit boards.

Bag Cover Assembly Removal

1. Refer to Figure 6-1. Unlock and open the Bag Cover (1).
2. Remove the three pan head screws (3). Save the screws for use during reassembly.
3. Remove the Hinge Cover (4).
4. (Optional, if required) Remove the Mounting Plate (5), remove the two screws (2) that secure it to the Bag Cover (1).

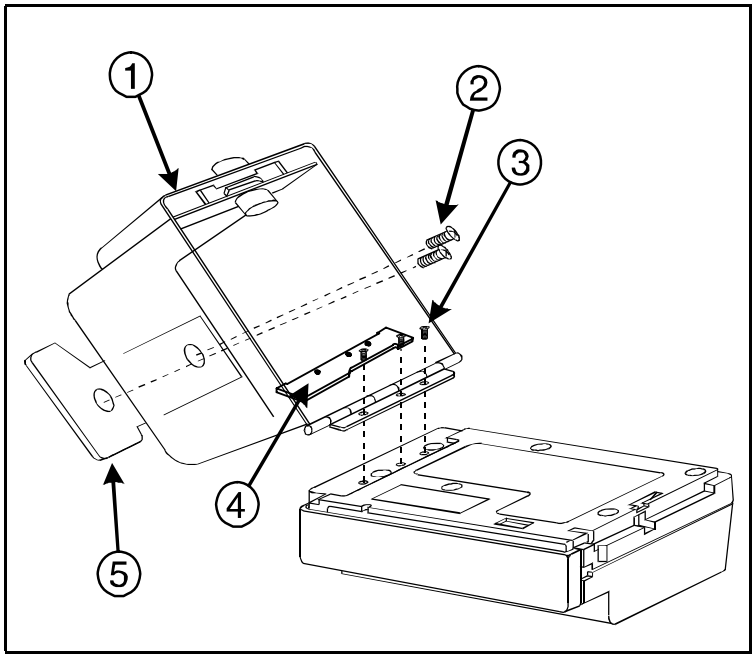


Figure 6-1. Bag Cover Removal

MPU PCBA Handling Guidelines

When the MPU PCBA is removed (either partially or fully) during this procedure, the assembly must be handled as indicated in Figure 6-2.

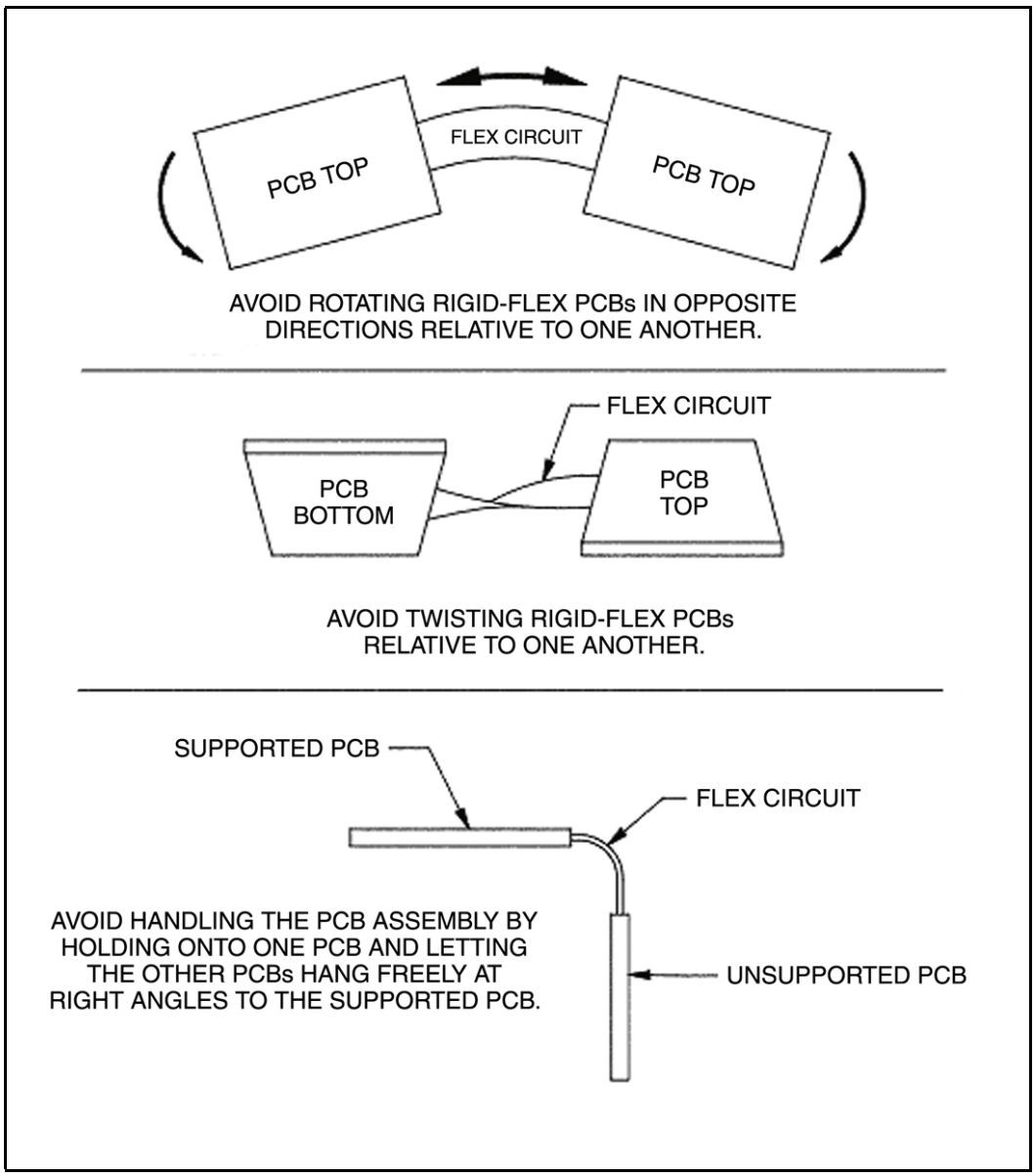

PCB TOP
FLEX CIRCUIT
PCB TOP
AVOID ROTATING RIGID-FLEX PCBs IN OPPOSITE DIRECTIONS RELATIVE TO ONE ANOTHER.
FLEX CIRCUIT
PCB BOTTOM
PCB TOP
AVOID TWISTING RIGID-FLEX PCBs RELATIVE TO ONE ANOTHER.
SUPPORTED PCB
FLEX CIRCUIT
AVOID HANDLING THE PCB ASSEMBLY BY HOLDING ONTO ONE PCB AND LETTING THE OTHER PCBs HANG FREELY AT RIGHT ANGLES TO THE SUPPORTED PCB.
UNSUPPORTED PCB

Figure 6-2. MPU PCBA Handling Guideline

Rear Case Assembly Removal

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly

2. Refer to Figure 6-3. Place the pump face down on a flat, clean surface.
3. Remove the six screws (2) and six flat washers (3) from the Rear Case Assembly (1).

CAUTION

The Rear Case contains the Primary PCB. This circuit board is connected to the Secondary PCB located in the Front Case via a semi-rigid Flex Circuit (4). The Secondary PCB is also attached to the Connector PCB by a similar Flex Circuit. Extreme care must be taken to prevent any damage to these Flex Circuits. To remove the circuit boards from the Front and Rear Cases, refer to the MPU PCBA Removal procedure later in this chapter.

4. Gently lift the Rear Case (1) from the rest of the pump assembly and lay it over on its back.

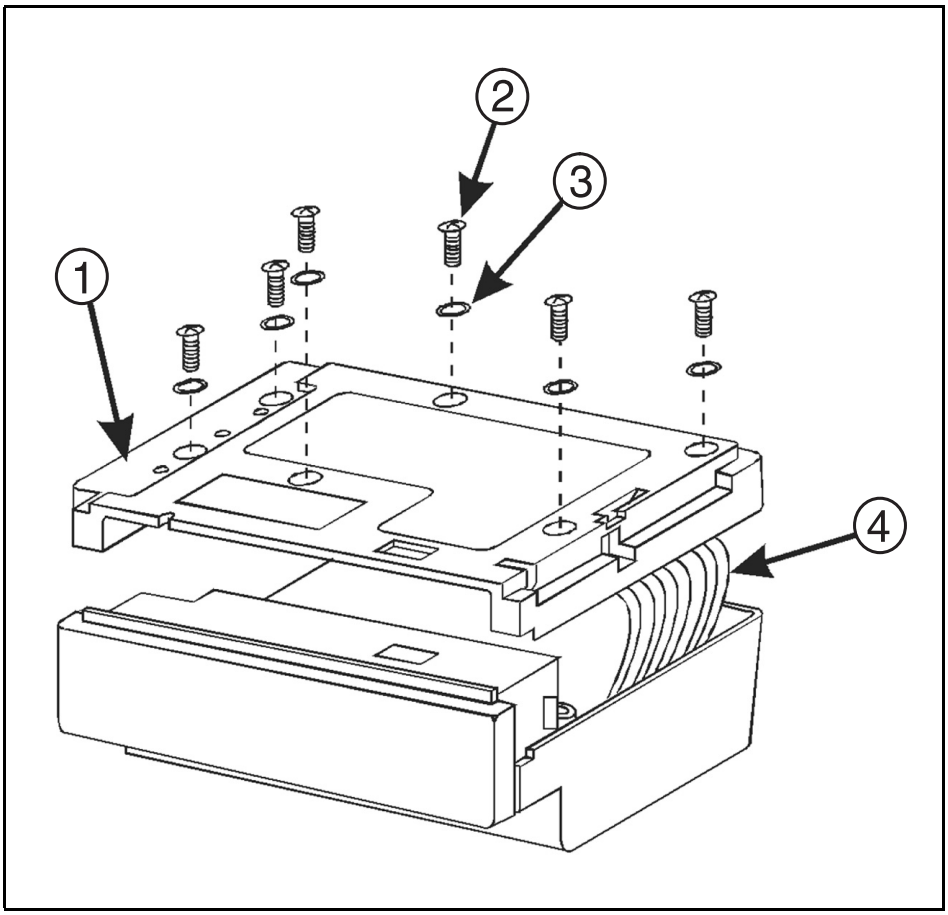


Figure 6-3. Rear Case Assembly Removal

Mechanism Assembly, DDMM PCBA, & Battery Wall Removal

NOTE: When the Mechanism Assembly is replaced, the pump must be calibrated.

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly
   Rear Case Assembly

2. The Battery Door (6) is free to be removed after the Rear Case is removed.
3. Refer to Figure 6-4. Remove the screw (3) and lift off the Motor Retainer Bracket (4). Carefully disconnect the six-pin motor connector (2) from J2 on the DDMM PCBA (10).
4. Locate the fifteen-pin Flex Cable Connector (9), hold it by the edges, and carefully lift up from J14 on the Secondary PCB. (DO NOT pull on the Flex Cable.)
5. Lift the Mechanism Assembly (1) out of the Front Case.
6. To remove the Battery Wall (5), desolder the 30 ga jumper wire (11) from the solder pad on the DDMM PCBA. Carefully lift the DDMM PCBA straight up from J6 (8) and slide horizontally from under the ESD Flex Circuit Ground Tab (7). Slide the Battery Wall from under the ESD Flex Circuit Ground Tab (7) and lift out of the pump.

NOTE: For ease of parts identification, the ESD Flex Circuit is not shown in Figure 6-4.

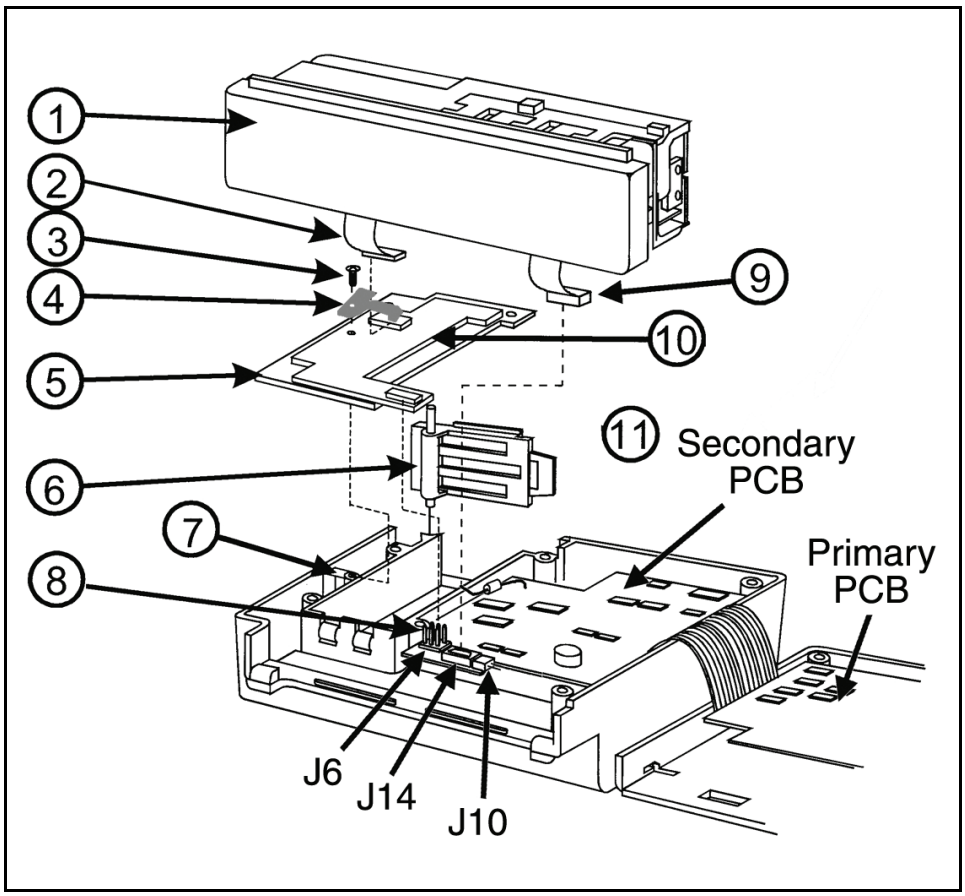


Figure 6-4. Mechanism Assembly, DDMM PCBA, and Battery Wall Removal

MPU PCBA Removal

NOTE: When the MPU PCBA is replaced, the pump must be calibrated.

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly
   Rear Case Assembly
   Mechanism Assembly, DDMM PCBA, and Battery Wall

2. Refer to Figure 6-5. Remove the jumper from J11 on the Primary PCB (7).
3. Remove the three screws (6) and three lock washers (8) that hold the Primary PCB (7) to the Rear Case Assembly (11).
4. Carefully lift the Primary PCB (7) and disconnect the Reed Switch Cable (10) from J1 (9) on the under side.
5. The Rear Case (11) can now be moved aside, using care not to damage the DDMM Hold-down Foam (12).

CAUTION Use extreme care to not damage the flex circuits when disconnecting and handling the MPU PCBA.

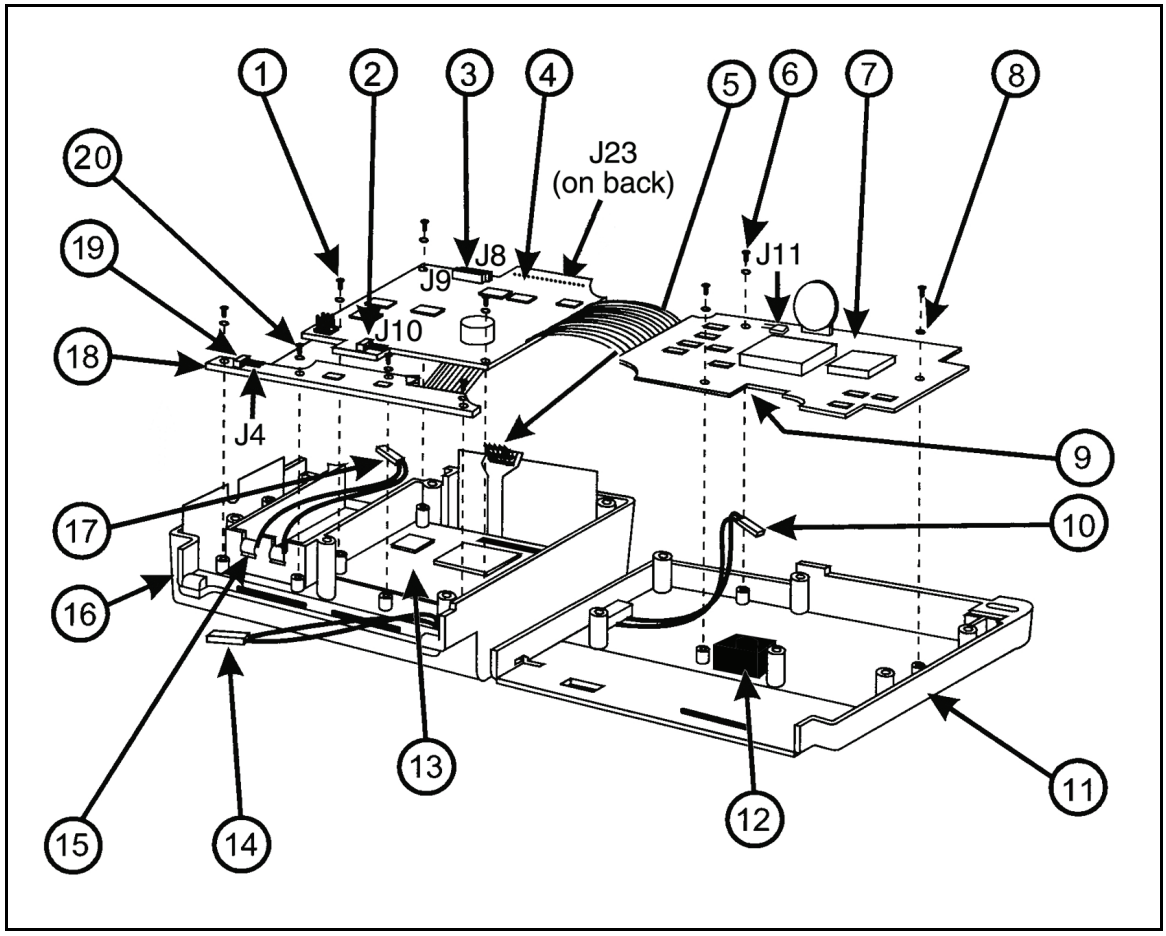


Figure 6-5. MPU PCBA Removal

NOTE: If Backup Battery replacement is required, proceed to the "Optional Procedures" topic in this chapter.

6. Disconnect the ten-pin Keypad Flex Cable (5) from J8/J9 (3) on the Secondary PCB (4).
7. Disconnect the two-pin Battery Harness Connector (17) from J10 (2) on the Secondary PCB (4).
8. Use caution to not damage the ESD Flex Circuit Ground Tab under the Negative Battery Connector (15), and carefully remove the Battery Harness.
9. Remove the three screws (1) and three lock washers (8) that attach the Secondary PCB to the Front Case Assembly (16).

NOTE: There is a 16-pin connector, J23, on the underside of the Secondary PCB (4) which connects to a mating connector on the LCD Module (13).

10. Use a small screwdriver at the back edges of the Secondary PCB (4) to gently lift the PCB from the LCD Module (13) below.
11. Raise the front of the Secondary PCB to access the mounting screws for the Connector PCB (18) below.
12. Disconnect the two pin AC connector (14) from J4 (19) on the Connector PCB (18).
13. Remove the four screws (20) and four lock washers (8) that hold the Connector PCB (18) to the Front Case Assembly (16).
14. The complete MPU PCBA can now be carefully lifted from the Case.

ESD Flex Circuit Removal

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly
   Rear Case Assembly
   Mechanism Assembly, DDMM PCBA, and Battery Wall
   MPU PCBA

2. Refer to Figures 6-6 and 6-7. Starting at the rear of the Front Case, carefully raise the ESD Flex Circuit and release the two tabs from around the keypad cable.

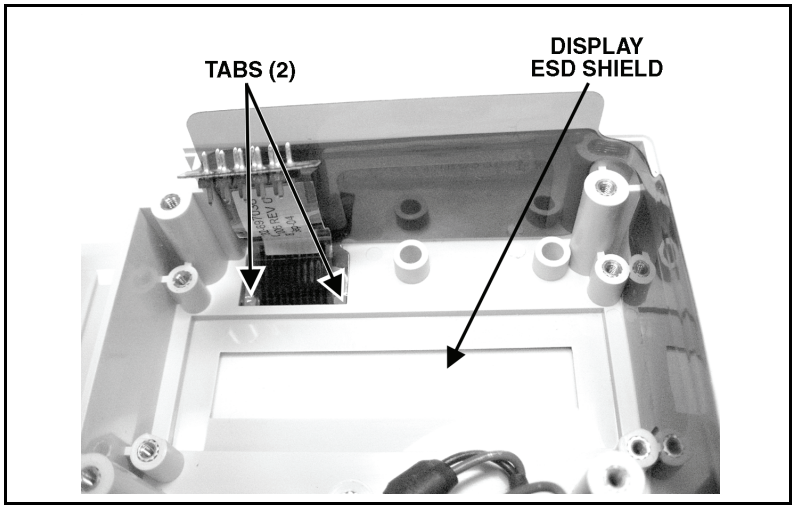


Figure 6-6. ESD Flex Circuit and Display ESD Shield

3. Continue in a clockwise direction and carefully remove the ESD Flex Circuit from the Front Case.

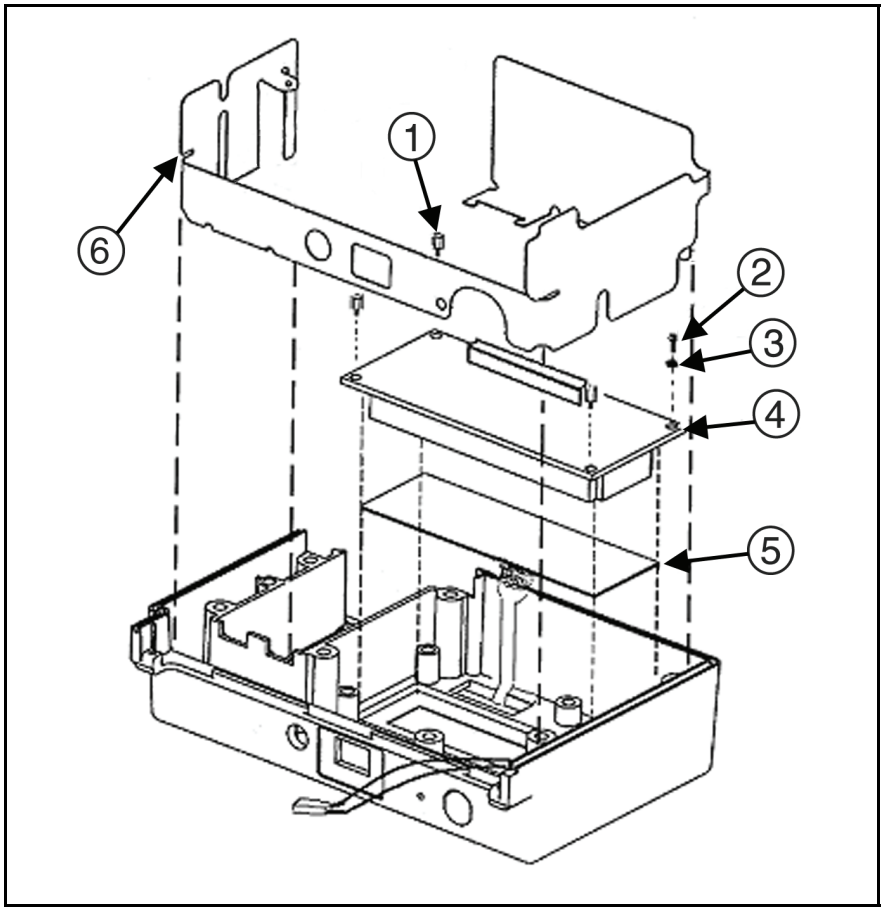


Figure 6-7. ESD Flex Circuit & LCD Module Removal

LCD Module Removal

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly
   Rear Case Assembly
   Mechanism Assembly, DDMM PCBA, and Battery Wall
   MPU PCBA
   ESD Flex Circuit

2. Refer to Figure 6-7. Remove the three standoffs (1), one screw (2), and one lock washer (3), that secure the LCD Module (4) to the Front Case Assembly.

NOTE: To remove the three standoffs, it will be necessary to use a 3/16" nutdriver with an outer diameter less than 0.26".

3. Lift the LCD Module away from the Front Case Assembly.

4. Remove the clear Display ESD Shield (5) by turning over the Front Case. The Display ESD Shield should fall out. Remove by hand if necessary.

Optional Procedures

3V Backup Battery Replacement

To determine if the Backup Battery needs to be replaced, perform the 3V Backup Battery Test located in Chapter 7 of this manual. If the battery must be replaced, follow the procedures below.

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly
   Rear Case Assembly
   Primary PCB

2. Refer to Figure 6-8. On the Primary PCB, ensure the 2-pin jumper (1) has been removed from connector J11, located next to the Backup Battery (2).

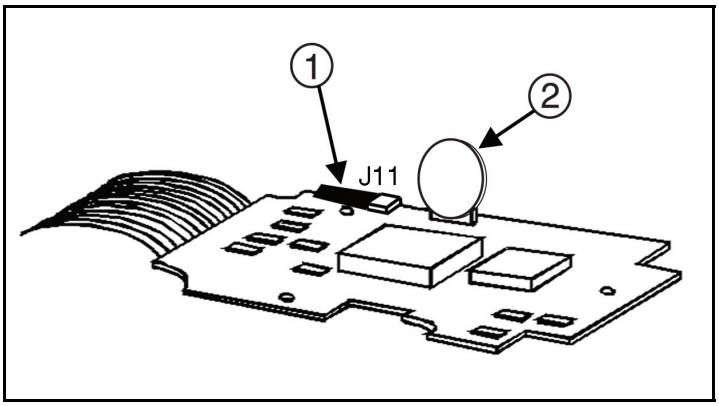


Figure 6-8. Backup Battery Replacement

3. Once the Primary PCB is removed from the Rear Cover, hold the Mechanism Assembly in position and carefully turn over the Front Case Assembly and the Primary PCB.
4. Using care not to overheat the circuit board, carefully desolder the Backup Battery.
5. If tape is not present on the replacement 3V Backup Battery (p/n 6465634), apply a 20 mm long piece of 3M/Scotch Filament Tape 898 over the battery.
6. Ensure the replacement 3V Battery is positioned properly, then insert the battery leads through the circuit board.
7. Use proper soldering technique and solder the new battery to the board. If necessary, trim off the leads.
8. Carefully turn the entire assembly right side up.
9. Connect the Reed Switch cable to J1 on the underside of the Primary PCB. Use three screws and 3 lock washers to reinstall the Primary PCB onto the Rear Case.

NOTE: DO NOT install the 2-pin jumper (1) on connector J11 at this time.

10. While ensuring that no flex cables or wires are caught between the Front and Rear Cases, close the Pump Case and hold the pump together while continuing to the next topic to initialize the 3V Backup Battery.

Initializing the 3V Backup Battery

The Backup Battery **must be initialized** as follows:

1. Ensure the 2-pin jumper is removed from J11 on the Primary PCB then insert a 9-volt Battery into the pump.
2. Press the **ON/OFF** key to power up the pump. The pump will perform its Power On Self-Test.
3. Check that all the display segments light up during this self-test routine.

NOTE: After replacing the 3V Backup Battery, the initial screen display that normally shows **"Performing Power on Self Test"** may show a different language or be unrecognizable. The pump will continue to start up normally, and subsequent message screens will display normally. Future power up sequences will display **"Performing Power on Self Test"** as usual.

4. After the self-test is complete, select **ENGLISH**. The display must read **"NO RX PRESS ENTER"**. If not, remove the 9-volt battery and allow the pump to sit idle for a period of time (~30 seconds) then re-initialize the 3V battery, starting at step 2.
5. If any of the LCD display segments were not lit during the self-test, abort this initialization, remove the 9-volt battery, and perform the appropriate steps to troubleshoot and/or replace the LCD Module.
6. If all the LCD display segments light up during the self-test (do not turn the pump OFF), open the Rear Case, and install the 2-pin jumper connector (1) onto J11 on the Primary PCB.
7. Once the 2-pin jumper is installed onto J11, turn the pump off.
8. Press the ON/OFF key and ensure the pump properly performs the Power On Self-Test, then turn the pump back OFF.

Keypad Replacement

If replacing the Keypad on the Front Case, obtain either a Keypad with Spacer kit (p/n B069610006RP).

1. Refer to the previous disassembly instructions to remove the following items:

   Bag Cover Assembly
   Rear Case Assembly
   Mechanism Assembly
   MPU PCBA
   LCD Module
   ESD Flex Circuit

NOTE: A keypad cannot be reused after it has been removed from the Front Case.

2. Position the Front Case with the Keypad facing up.
3. Use a small tool to lift a corner of the Keypad, then carefully peel it completely away from the Front Case. Under the Keypad, a Keypad Spacer is held in position with Permabond 792.
4. Carefully remove the Keypad Spacer from the Front Case, then pull the 10-pin Keypad Cable through the slot.

5. Clean off all residual adhesive from the Front Case (3) using Isopropyl alcohol, then immediately wipe it dry.
6. Refer to Figure 6-9. Manually create a permanent crease in the new Keypad Cable. This bend must be approximately 90°.

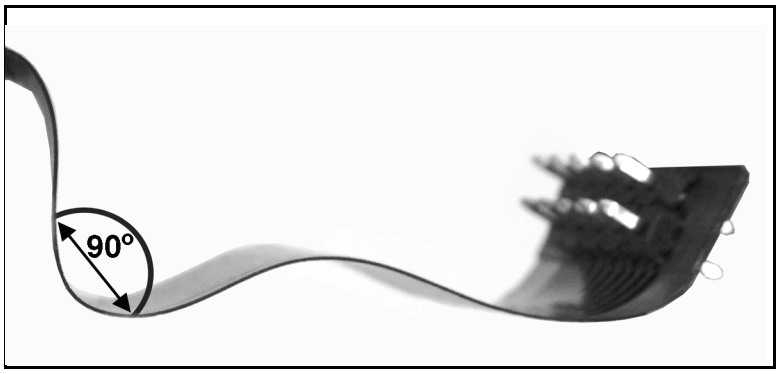


Figure 6-9. Keypad Cable

7. Remove the small piece of adhesive liner from behind the Keypad Cable.
8. Refer to Figures 6-10, 6-11, and 6-12. Insert the new Keypad Cable through the opening in the Front Case.

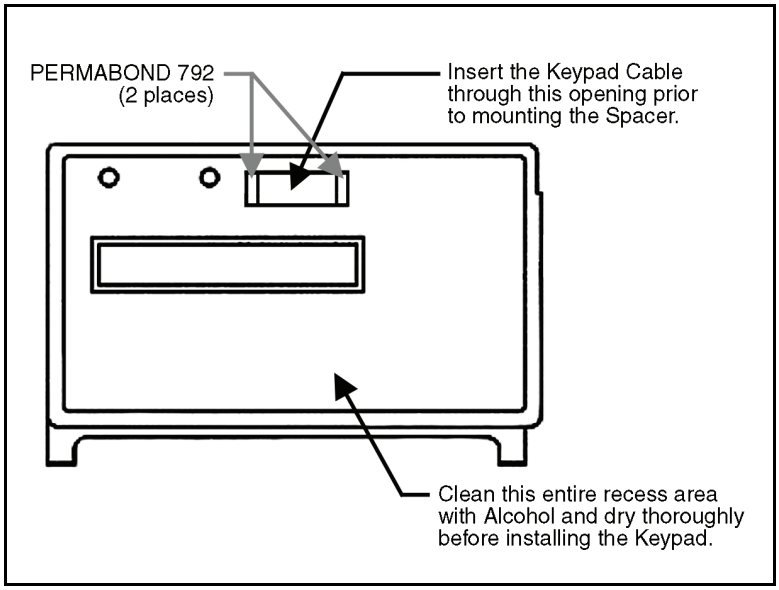

PERMABOND 792
(2 places)
Insert the Keypad Cable through this opening prior to mounting the Spacer.
Clean this entire recess area with Alcohol and dry thoroughly before installing the Keypad.

Figure 6-10. Keypad Replacement

9. Refer to Figure 6-10. Apply a small amount of Permabond 792 onto both ledges on the Front Case where the Spacer will sit.
10. Refer to Figure 6-11. Place the Spacer into its position on the Front Case as shown, and hold in place for a minimum of 10 seconds. The upper edge of the Spacer must be against the upper edge of the opening as illustrated.

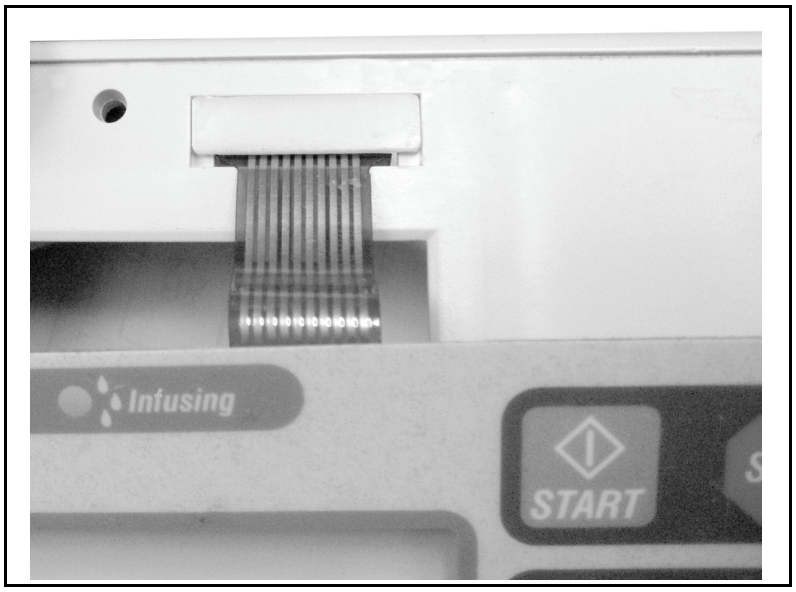


Figure 6-11. Front Case and Keypad Assembly

11. Remove the remaining portion of the paper liner from the back of the Keypad.
12. Beginning with the top edge of the Keypad, place the Keypad into position on the Front Case.
13. Press the entire Keypad down onto the Front Case from the center of the Keypad outward. Ensure that all the edges of the Keypad sit flat inside the raised ridge around the front of the pump.
14. Allow the assembly to cure for a minimum of 24 hours at room temperature.

Assembly Procedures

NOTE: During assembly, screws should be tightened to torques listed in the procedures.

NOTE: After replacing either the Mechanism Assembly or any Circuit Board Assembly, the pump must be calibrated. Refer to Chapter 7. Failure to properly calibrate the pump may result in occlusion detection or air-in-line detection failures.

NOTE: After repair is complete, all pumps must pass the general checks in Chapter 7 and the functional tests in Chapter 5.

Torque Specifications

Torque requirements for fasteners (typically 22 - 28 in-oz.) are provided as needed within the specific replacement procedures in this chapter. When specific torques requirements are not given, use care to not over tighten those fasteners during assembly.

Installing the Front Case & Keypad Assembly

Two options exist for replacement of the Front Case and Keypad Assembly. Steps 1 and 2 below will assist in determining which replacement option to use.

1. If replacing the Front Case and Keypad Assembly, obtain p/n B069180004RP, skip the remaining steps in this procedure, and continue to **"**Installing the ESD Flex Circuit**"** procedure.
2. If replacing the Keypad on the Front Case, obtain a Keypad with Spacer kit (p/n B069610006RP). For proper installation, refer to the Keypad Replacement procedure located earlier in this chapter.

Installing the ESD Flex Circuit

1. Refer to Figure 6-12. Prior to installing the ESD Flex Circuit (p/n B069110002), ensure the Serial Number Label is attached to the Front Case as shown. If replacing the Front Case, remove the label from the old Front Case and apply it to the new one as shown.

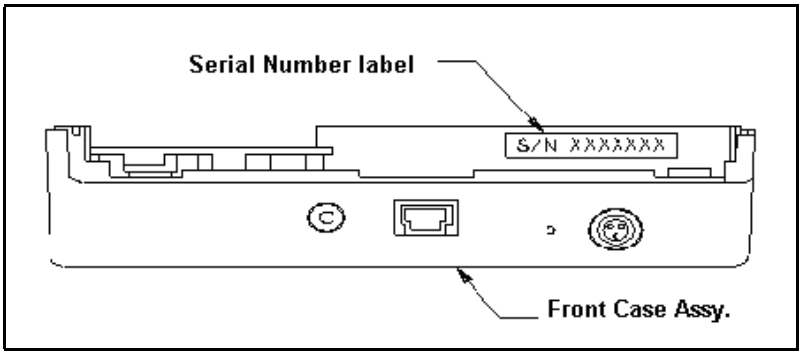


Figure 6-12. Serial Number Label Location

2. Refer to Figure 6-13. Make sharp right angle creases at locations 1, 2, 3, and 4 (respectively in order) as indicated. The bend point location is indicated by the notches on the ESD Flex Circuit and the bend direction is shown.

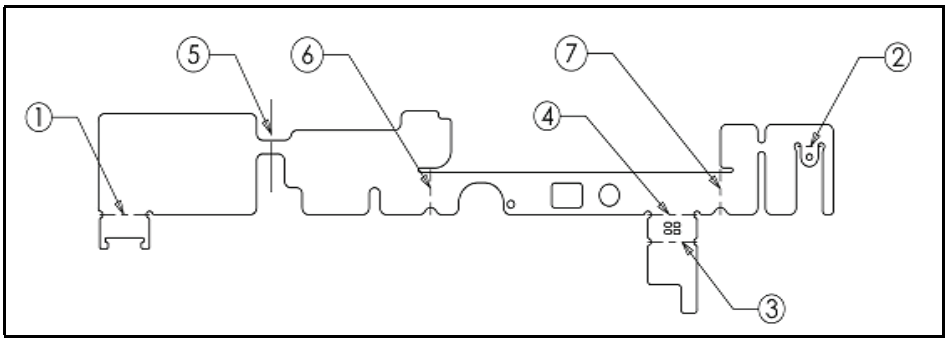


Figure 6-13. ESD Flex Circuit Preparation

3. Refer to Figure 6-13. Make gentle bends at locations 5, 6, and 7, (respectively in order) as indicated. DO NOT crease these bends. See Figure 6-14 for proper results.

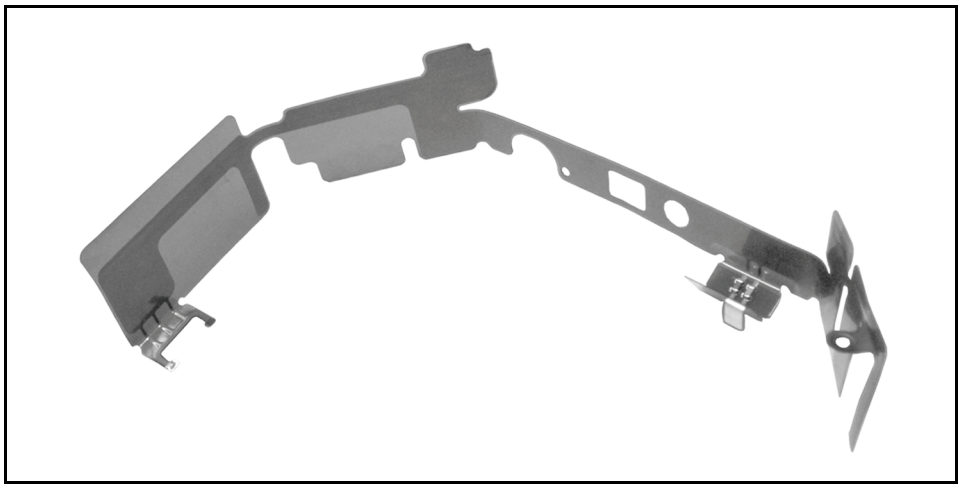


Figure 6-14. ESD Flex Circuit

4. Refer to Figure 6-15. Position the ESD Flex Circuit around the perimeter of the Front Case, then bend the ground tab around the battery compartment wall.

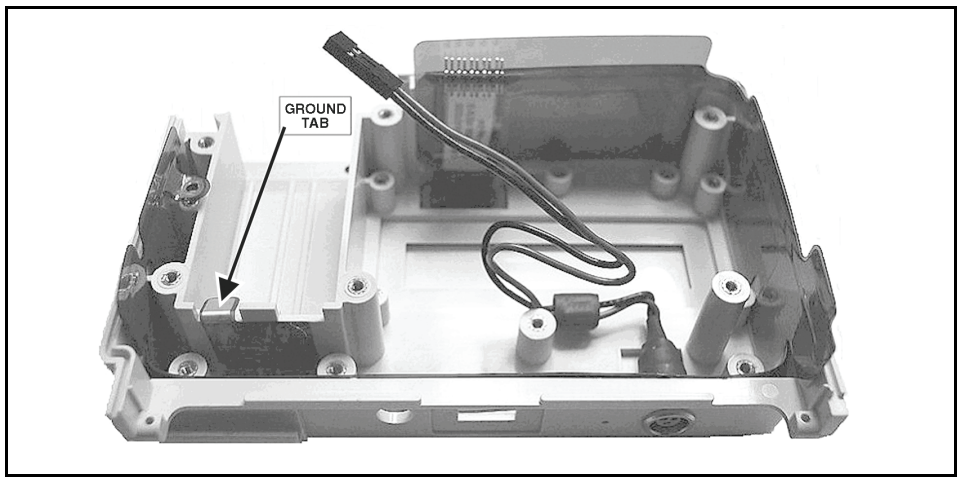


Figure 6-15. ESD Flex Circuit Installation

NOTE: In the following step, use caution not to damage the ESD Flex Circuit when installing the negative battery contact.

5. Install the negative contact of the battery harness into position over the ESD Flex Circuit Ground Tab as shown in Figure 6-16.

NOTE: If there is corrosion or rust on the battery contacts, replace the harness.

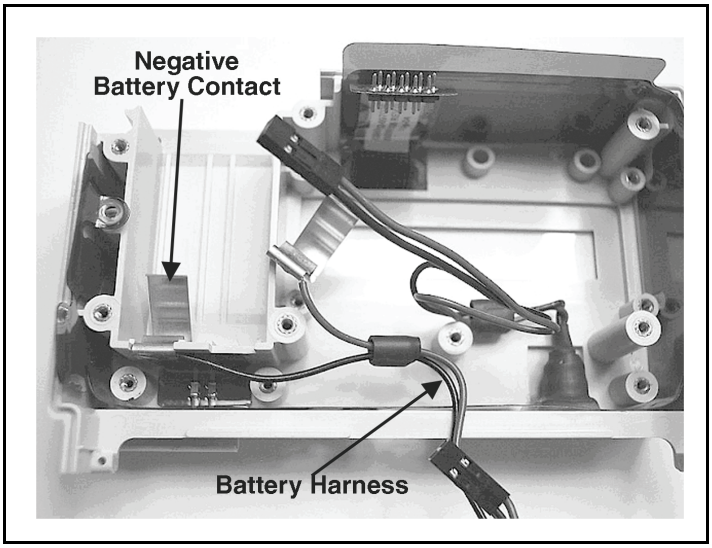


Figure 6-16. Negative Battery Connector Installation

6. Refer to Figure 6-17. Make sure the two tabs of the ESD Flex Shield are placed in the recess edge of the slot for the 10-pin keypad cable as shown.

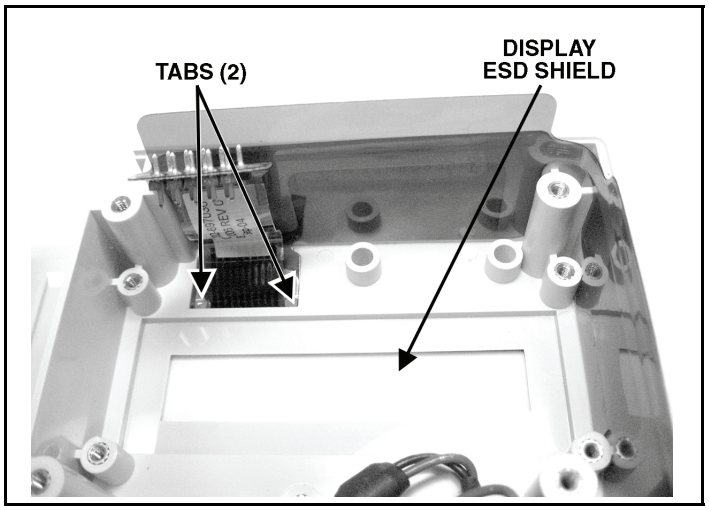


Figure 6-17. ESD Tabs & Shield Positioning

7. Perform the ESD Flex Circuit Continuity test as follows:

   a. Set the multimeter to **"**Continuity**"** testing mode and verify the continuity of the ESD Flex Circuit by probing the negative (-) battery contact point and the conductive coating on the outer surfaces of the ESD Flex Circuit. Pay particular attention to the conductive tabs.

   b. If continuity is not found, reposition or replace the ESD Flex Circuit as needed.

Installing the Display ESD Shield

1. Lay the Front Case with Keypad face down.
2. If present, peel the frosted plastic sheet from the clear Display ESD Shield (p/n B069610005).

NOTE: Ensure there is no dirt, dust, or lint on the Display ESD Shield.

3. Refer to Figure 6-17. Place the Display ESD Shield into the recess around the display opening.

Installing the LCD Module

1. If present, remove the protective film from the LCD Module Display (p/n B069494000).
2. Refer to Figure 6-18. Set the LCD Module in the Front Case recess over the ESD Shield as shown.
3. Attach the LCD Module to the Front Case with three hex standoffs using a nut driver with an outer diameter less than 0.26” (TE1193).
4. Install the mounting screw and lock washer.
5. Torque the hex standoffs and the mounting screw to 22 – 28 in-oz.
6. Route the AC connector wires as shown in Figure 6-18. The ferrite must be positioned under the LCD Module.

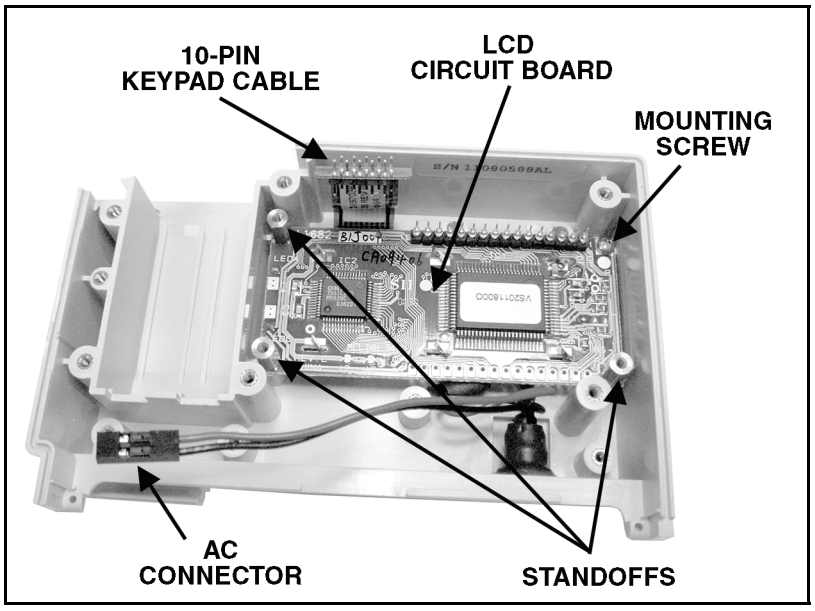


Figure 6-18. LCD Module Installation

7. Inspect the Front Case to ensure:
    a. The LCD Module Assembly is secured by 3 standoffs and one screw.

MPU PCBA Handling Instructions

When the MPU PCBA is removed (either partially or fully) during this procedure, the assembly must be handled as indicated in Figure 6-19.

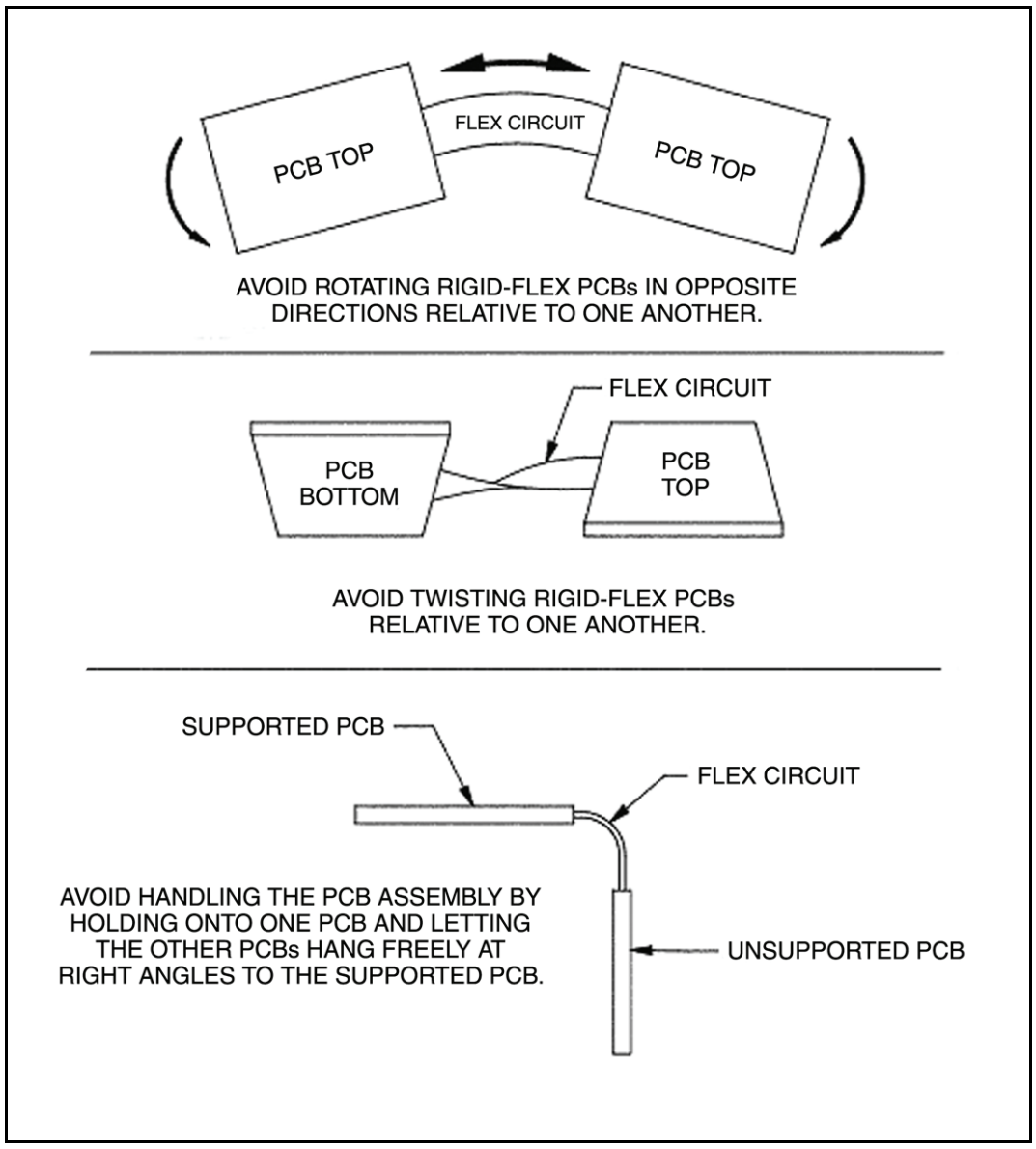

PCB TOP
FLEX CIRCUIT
PCB TOP
AVOID ROTATING RIGID-FLEX PCBs IN OPPOSITE DIRECTIONS RELATIVE TO ONE ANOTHER.
FLEX CIRCUIT
PCB BOTTOM
PCB TOP
AVOID TWISTING RIGID-FLEX PCBs RELATIVE TO ONE ANOTHER.
SUPPORTED PCB
FLEX CIRCUIT
AVOID HANDLING THE PCB ASSEMBLY BY HOLDING ONTO ONE PCB AND LETTING THE OTHER PCBs HANG FREELY AT RIGHT ANGLES TO THE SUPPORTED PCB.
UNSUPPORTED PCB

Figure 6-19. MPU PCBA Handling Guideline

Installing the MPU PCBA

Prior to installing the MPU PCBA, use a 3X eye piece (or other equivalent magnifying system) to perform a visual inspection of connector J14. For proper operation of the Mechanism Assembly, sensors, and switches, ensure there is no damage, foreign material, or corrosion in or around the connector. If any signs of these contaminants are present, clean the connector or replace the MPU PCBA.

Also, refer to Chapter 7, **"**Tests & Calibration**"**, and perform the 3V Backup Battery Check. If the battery does not pass the tests, replace the Backup Battery before installing the MPU PCBA into the pump.

1. Refer to Figure 6-20. Ensure that the flex circuit between the Secondary PCB and the Connector PCB has an **"**S-Shaped**"** bend with the bend radii approximately equal.
2. Refer to Figure 6-20. Ensure that the flex circuit between the Primary PCB and the Secondary PCB has a **"**hump-shaped**"** bend.

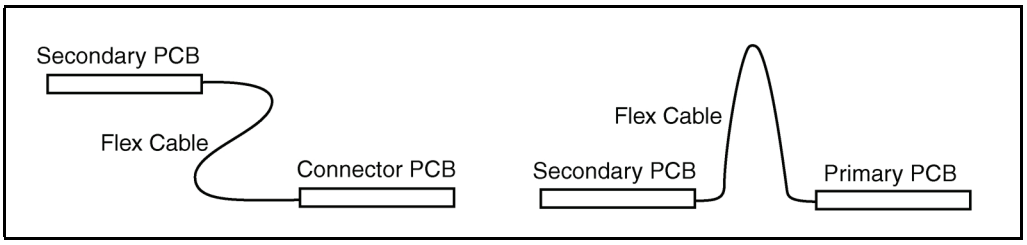


Figure 6-20. MPU PCBA Flex Circuit Bends

3. Refer to Figure 6-21. Plug the 2-pin connector from the Reed Switch on the Rear Case Assembly into J1 on the bottom of the Primary PCB as shown.

NOTE: The orientation of the red lead is next to the outside edge of the Primary PCB.

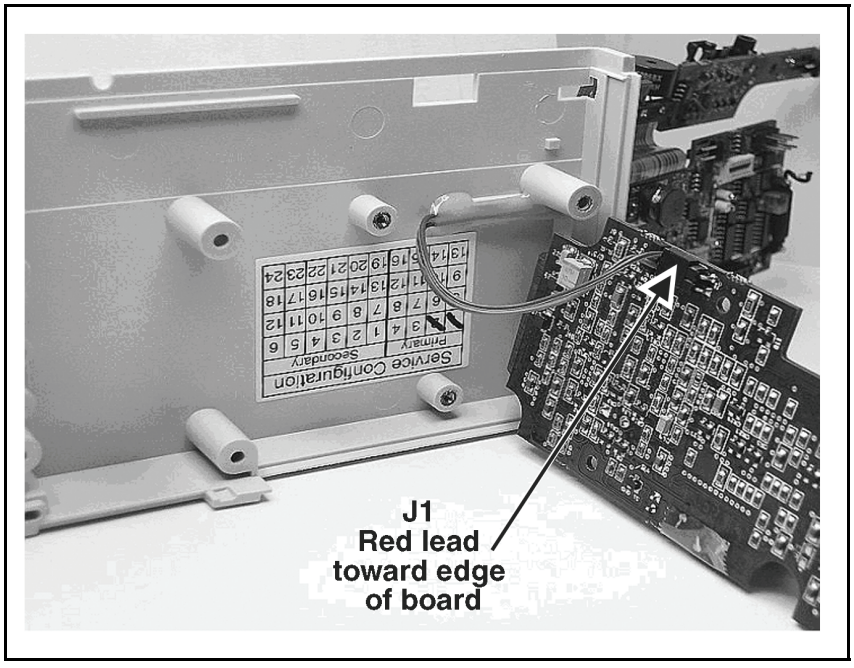


Figure 6-21. Reed Switch Connection

4. Refer to Figure 6-22. Lay the Rear Case Assembly on its back and place the Primary PCB in place over the shorter mounting bosses.
5. If necessary, remove the J11 jumper to access the screw mounting hole on the PCB.
6. Secure the Primary PCB onto the Rear Case using three 2-56 X 1/4" Pan Head Screws (p/n 5101101) and three #2 Lock Washers (p/n 5110049) as shown in Figure 6-22. Torque screws to 22 - 28 in-oz.

7. Re-install the J11 jumper.

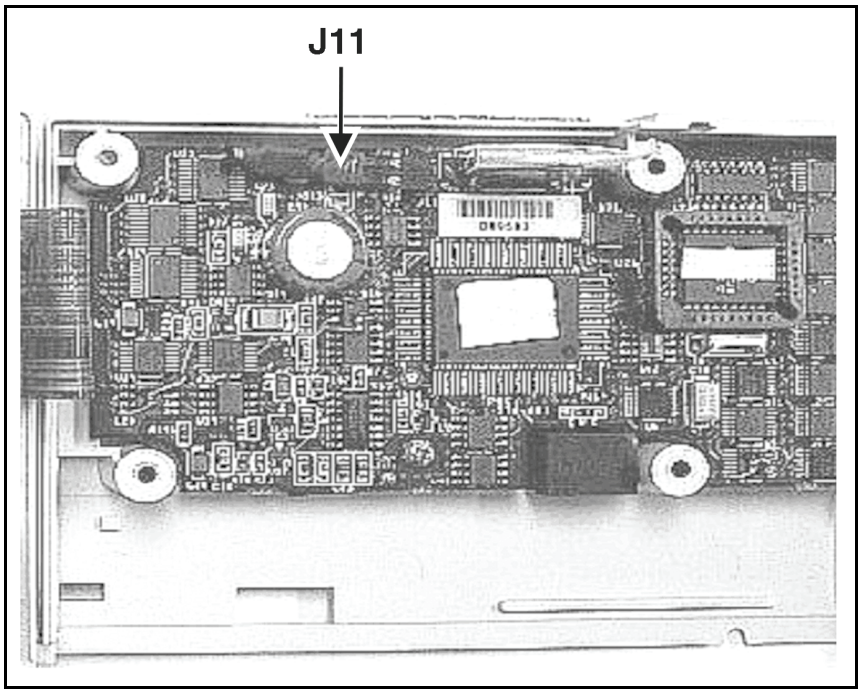


Figure 6-22. Installed Primary PCB

8. Inspect the Front Case to ensure:

    a. The 2-pin connector from the Reed Switch is **fully inserted** onto J1 underneath the Primary PCB.

9. In the Front Case, carefully move the AC connector cable out of the way, then gently place the Connector PCB into position as shown in Figure 6-24.

NOTE: The AC connector wires should come up around the edge of the board near the flex cable.

10. Ensure that the Printer Connector and the PCA Connector align with their respective port holes on the Front Case as shown in Figure 6-23.

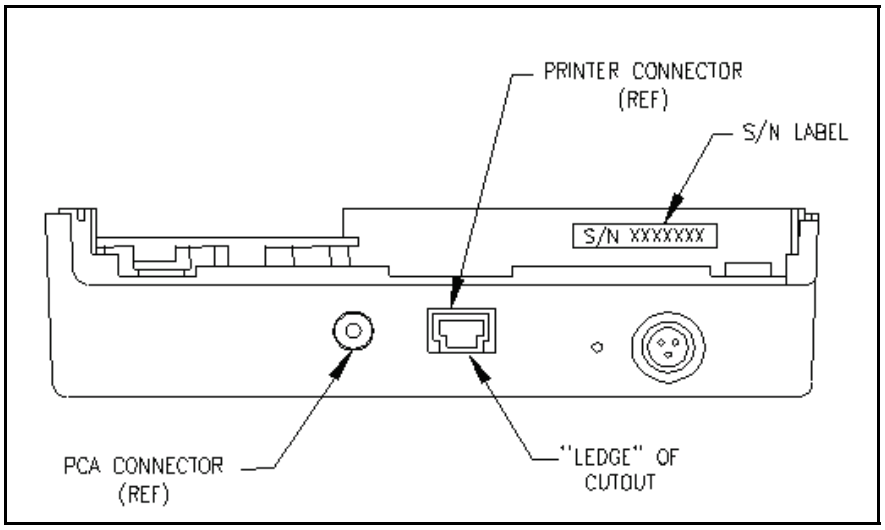


Figure 6-23. Connector Alignment

11. Secure the Connector PCB onto the Front Case using four 2-56 X 1/4" Pan Head Screws and four #2 Lock Washers as shown in Figure 6-24. Torque screws to 22 - 28 in-oz.

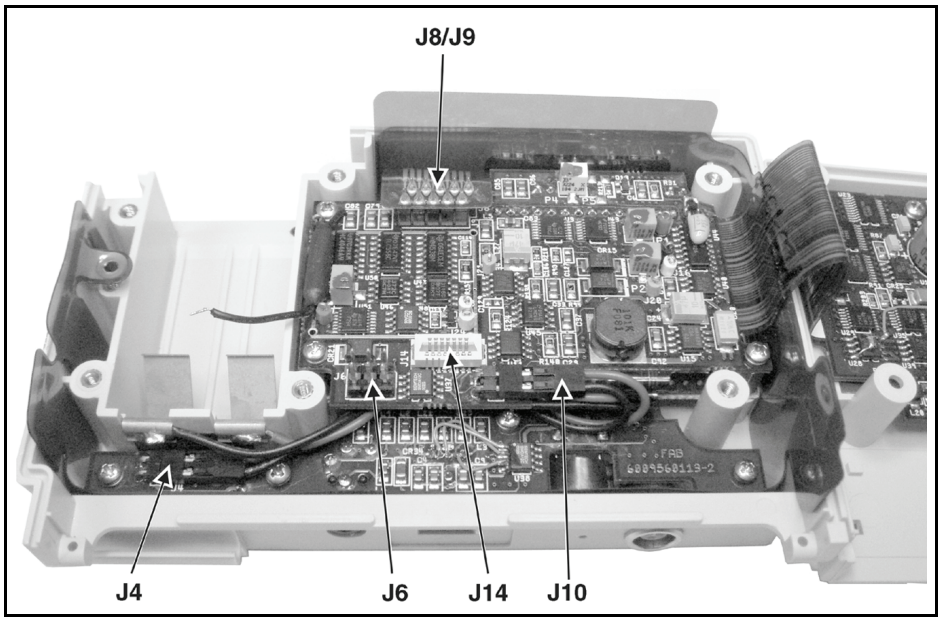


Figure 6-24. Installed Secondary & Connector PCBs

12. Refer to Figure 6-24. Plug the 2-pin AC connector into J4 on the Connector PCB with the Black wire toward the outside of the Pump.
13. If not already attached, install the Positive Battery Terminal onto the Front Case.
14. To position and secure the Secondary PCB, move the battery contact wire carefully out of the way.
15. While lining up the Secondary PCB screw holes with the stand off holes, carefully press the 16-pin connector, J23, on the bottom of the Secondary PCB down onto the mating connector on the LCD Module. Ensure that the two LEDs align properly with their respective holes in the Front Case.
16. Secure the Secondary PCB to the Front Case using three 2-56 X 1/4" Pan Head Screws and three #2 Lock Washers. Torque screws to 22 - 28 in-oz.
17. Plug the Keypad Cable into J8/J9 on the Secondary PCB.
18. Gently tuck the excess slack of the AC Connector wires between the Secondary PCB and the LCD Module.
19. Plug the 2-pin Battery Contact Connector into J10 on the Secondary PCB with the black wire toward the outside of the pump.
20. Position the Ferrite so that it ends up between the Secondary PCB and the Connector PCB and gently tuck the Battery Contact wires under the Secondary PCB.
21. Inspect the Front Case to ensure:
    a. The 16 pin connector, J23 on the bottom of the Secondary PCB is properly connected to the mating connector on the LCD Module.
    b. The 2-pin AC Connector is fully inserted onto J4 on the Connector PCB with the BLACK WIRE toward the outside of the pump.

Installing the Battery Wall & DDMM PCBA

1. Refer to Figure 6-25. Place the Battery Wall (p/n B069120008RP) on top of the Battery Compartment, ensuring it is positioned under the ESD Flex Circuit Tab.
2. Position the DDMM PCBA (p/n B069130010) on top of the Battery Wall. Ensure that the PCBA is also positioned under the ESD Flex Circuit Tab. Carefully plug the 6-pin connector of the DDMM PCBA down onto J6 of the Secondary PCB.

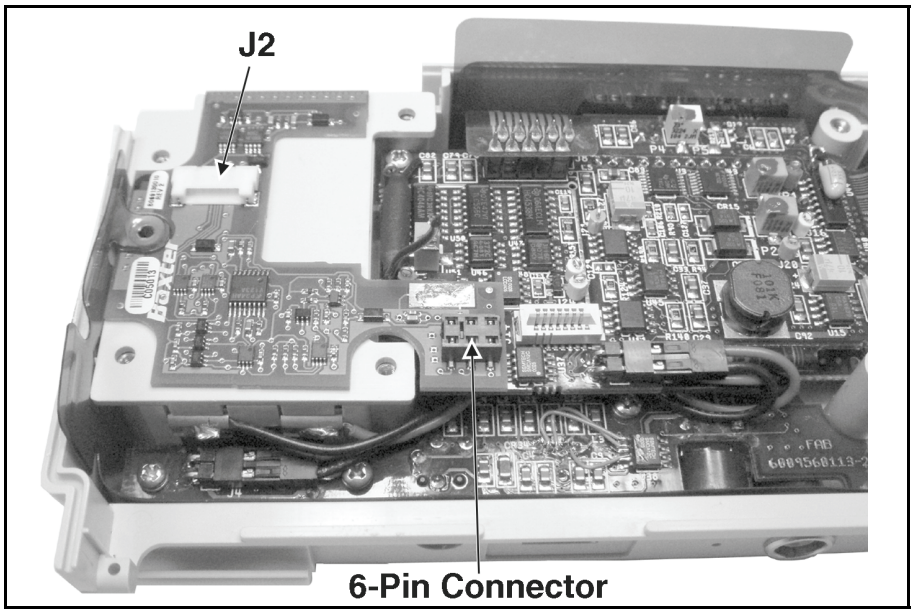


Figure 6-25. DDMM PCBA Installation

3. Solder the end of the wire that runs through the Ferrite Bead on the Secondary PCB to the ground wire pad on the DDMM PCBA. See required wire routing in Figure 6-26. Dress the wire under the DDMM PCBA if the wire length is too long.

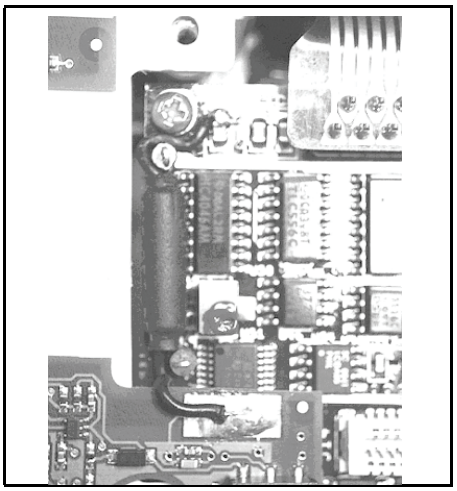


Figure 6-26. Ground Wire Soldering

Installing the DDMM PCBA Hold-down Foam

1. Refer to Figure 6-27. If not currently in place, attach two pieces of Hold-down Foam (p/n B069090000), one on top of the other, to the Rear Case as shown.

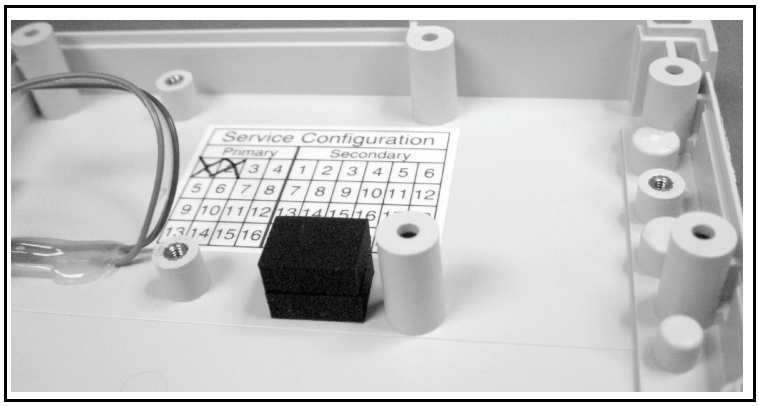


Figure 6-27. Hold-down Foam Installation

Installing the Mechanism Assembly

1. Refer to Figure 6-28. Slide the Mechanism Assembly (p/n B069120016RP) down into position on the Front Case, being careful not to pinch any of the existing wires. Ensure both the Motor Cable and the Flex Cable are not trapped under the Mechanism Assembly. The ribs and bosses of the Front Case must be engaged into their respective slots on the ends of the Mechanism Assembly.

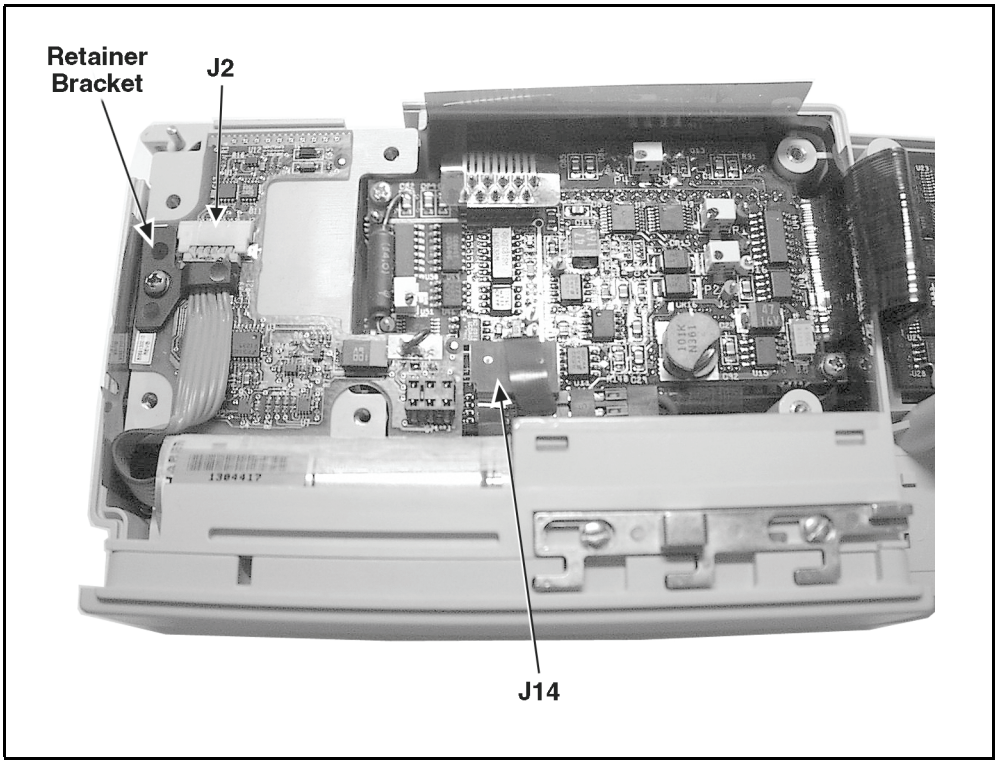


Figure 6-28. Installing the Mechanism Assembly

2. To ensure proper operation of the Mechanism Assembly, sensors, and switches, perform a visual inspection using a 3X eye piece or other equivalent magnifying system

to check the Flex Cable connector to ensure that there is no damage, dirt, and/or bend in the connector and that there is no foreign material or corrosion on the connector.

3. Refer to Figure 6-28. Grasp the edges of the 15-pin Flex Cable connector from the mechanism assembly and insert it into J14 on the Secondary PCB. DO NOT press on the Flex Cable itself.
4. Refer to Figure 6-28. Apply Nyogel 760G onto the pins of J2 connector on the DDMM PCBA. Plug the six-pin motor connector from the Mechanism Assembly into J2 on the DDMM PCBA (note pin 1 orientation). Ensure the Motor Connector is fully seated into J2. Wipe off excess Nyogel 760G using a cotton swab or cloth.
5. Refer to Figure 6-28. Apply Loctite 425 to the threads of a 2-56 x 3/8" Screw (p/n 5101103). Use this screw to secure the Retainer Bracket, ESD Flex Circuit, DDMM PCBA, and Battery Wall to the pump housing. The ring of the ESD Flex Circuit should be positioned between the DDMM PCBA and the Retainer Bracket. Ensure the DDMM PCBA connector is properly seated on J6 of the Secondary PCB, then tighten the screw with a torque of 22-28 in-oz.
6. Inspect the Front Case to ensure:

    a. J1 of the DDMM Board is seated properly onto J6 of the Secondary PCB.

Installing the Battery Door

1. Place the Battery Door (p/n B069620008) into its position on the Front Case as shown in Figure 6-29, with the pin of the door in the slot of the Front Case.

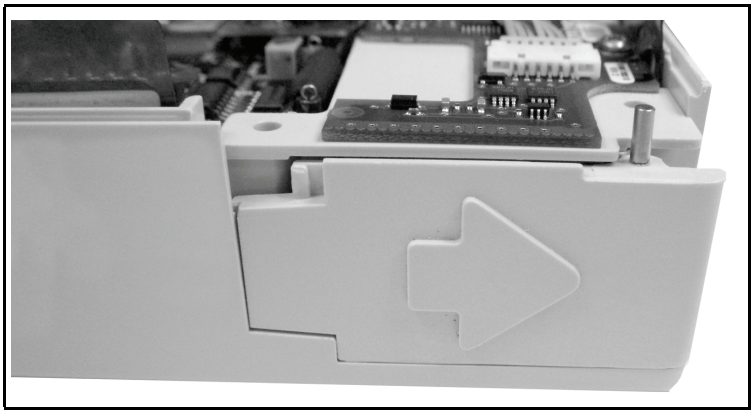


Figure 6-29. Battery Door Installation

Pump Calibration

At this point in the assembly process, it is a requirement that the Calibration Procedure in Chapter 7 be performed. The Calibration Procedure must be performed whenever the Mechanism Assembly and/or the MPU PCBA is removed or replaced. When the Pump Calibration procedure is complete, return to this point in the manual and continue with the remaining checks and assembly procedures.

Internal Inspection

Prior to closing the Pump Case, it is recommended that a qualified technician complete this internal inspection. Inspect the pump to ensure the following:

	INTERNAL INSPECTION
	FRONT CASE ASSEMBLY
a.	The Secondary PCB is secured by 3 screws. (Only 2 screws are visible when all PCBAs are installed.)
b.	The Keypad Cable is connected to J8 and J9 on the Secondary PCB.
c.	The 2-pin AC Connector is fully inserted onto J4 on the Connector PCB with the BLACK WIRE toward the outside of the pump.
d.	The Serial Number Label inside the Front Case behind the ESD Flex Circuit is present and matches the Serial Number on the Rear Case.
e.	There is no breakage on the Front Case internal or external surfaces.
	WIRE HARNESS & FLEX CIRCUIT
a.	All Wire Harnesses are routed properly and not pinched.
b.	The Flex Circuit between the Secondary PCB and the Connector PCB has an “S-shape” bend.
	MECHANISM ASSEMBLY
a.	There are four pieces of filament tape - two on top of the Mechanism Assembly, one on the back of the mechanism, and one on the motor.
b.	The Motor Connector Harness is not pinched.
c.	The Serial Number Label of the Mechanism Assembly is present on the Motor.
d.	The Mechanism Assembly Flex Cable connector is fully inserted into J14 of the Primary PCB. (**Do not push on the Flex Cable!**)
	BATTERY WALL AND ESD SHIELD
a.	The DDMM PCBA and Retainer Bracket are secured to the battery wall with a screw.
b.	The Motor Connector is connected properly to J2 on the DDMM PCBA.
	REAR CASE ASSEMBLY
a.	The Primary PCB is secured by 3 screws.
b.	Integrated Circuit U26 is fully inserted in its socket.
c.	The jumper is properly positioned on Connector J11.
d.	The 3V Backup Battery is sitting up straight.
e.	The S/N Label and OVERLAY are present on the outside of the Rear Case.
	IMPORTANT ACTIONS BEFORE AND AFTER CLOSING THE FRONT AND REAR HOUSING ASSEMBLIES.
a.	There is no loose hardware.

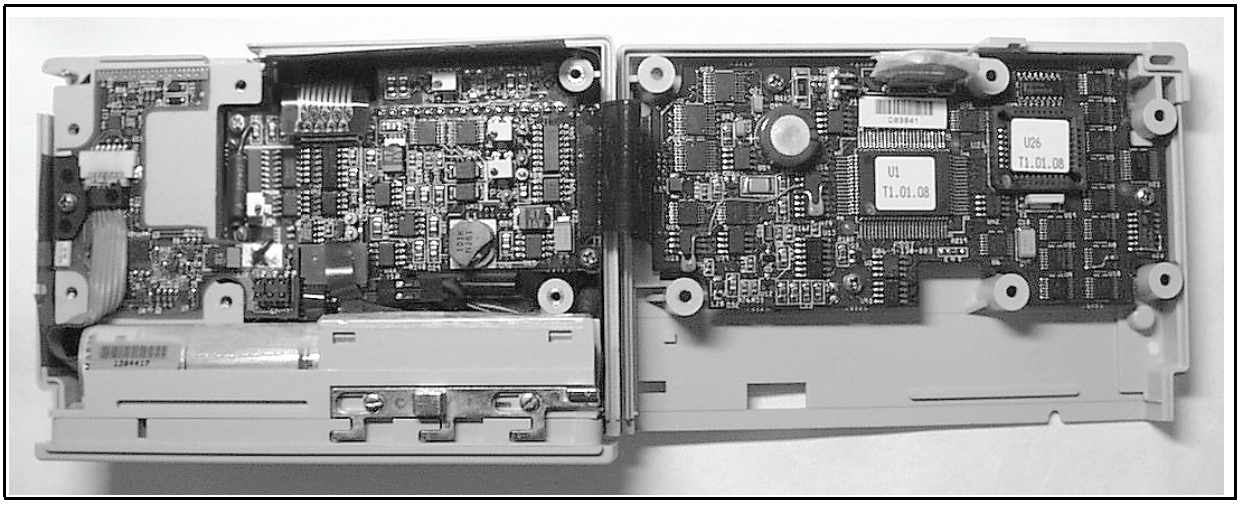


Figure 6-30. Completed Internal Pump Assembly

Closing the Case

1. Refer to Figure 6-31. Check that the Motor Cable is completely clear of the Battery Wall hole located just above and to the left of the Mechanism Assembly.

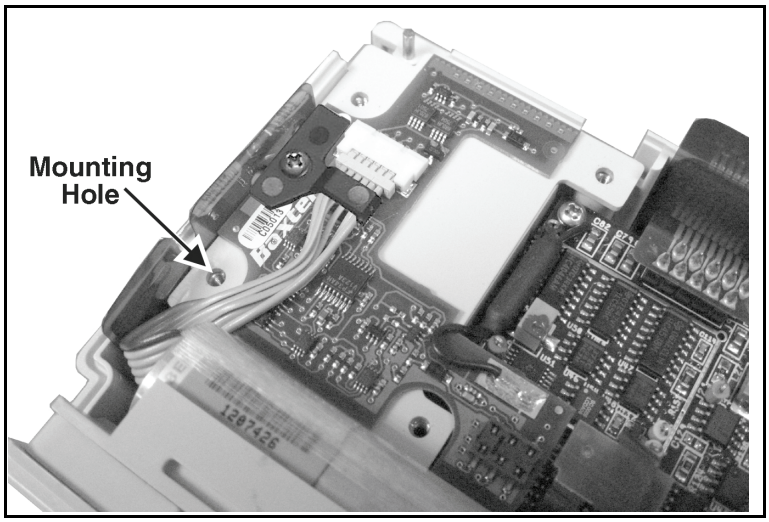


Figure 6-31. Mounting Hole Location

2. Refer to Figure 6-32. Carefully fold the Rear Case Assembly over the Front Case Assembly as shown.

NOTE: For proper assembly, the 3V Backup Battery must end up between the Keypad Cable and the Front Case.

3. Being careful not to pinch any wires or Flex Circuits, carefully press the case together.

Figure 6-32. Aligning the Front and Rear Cases

4. Move the Pump Case back and forth to check for any loose hardware and remove any found.

5. Secure the Front and Rear Cases together using six 2-56 x 3/8” Pan Head Screws (p/n 5101103) and six #2 Flat Washers (p/n 5143011). Torque screws to 22 - 28 in-oz.

6. Inspect the closed Pump Case to ensure:

    a. The Front and Rear Cases fit together evenly and there is no loose hardware.
    b. The Battery Door opens and closes properly.

Pump Functional Tests

The Pump Functional Test procedures are located in Chapter 5. These tests must be performed whenever the Mechanism Assembly and/or the MPU PCBA is removed or replaced. Only after passing these functional tests, can the pump be placed back into service.

Optional Assembly Procedures

Installing the Bag Cover Assembly

1. Refer to Figure 6-33. Align the metal Hinge against the recess on the Rear Case and place the Hinge Cover (p/n 4909620001) over the Hinge, oriented so that the notched area is aligned so the label on the back of the pump can be seen.
2. Assemble the 250E Bag Cover (p/n 2L3217) to the pump using three 2-56 x 1/4" Pan Head Screws (p/n 5101101) as shown in Figure 6-33. Torque screws to 22 - 28 in-oz.

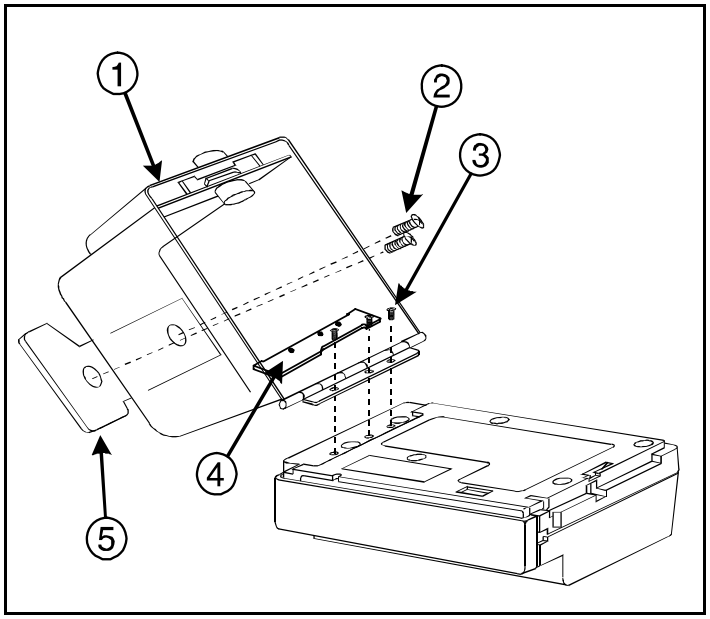


Figure 6-33. Bag Cover Assembly

NOTE: Service repairs/upgrades may require the installation of different bag covers.

2L3217	250 mL Extended Bag Cover
2L3218	100 mL Bag Cover
2L3220	250 mL Bag Cover
2L3221	500 mL Bag Cover
2L3261	250 mL Extended Bag Cover, Amber

NOTE: A hinge cover is not required on a 500 ML Bag Cover.

3. Inspect the pump to ensure:
   a. The Bag Cover's internal and external surfaces are not cracked or broken.

7 - Internal Tests & Pump Calibration

In this section **Page**

Overview 7-1
3V Backup Battery Test 7-2
Calibration Procedure 7-4
- Equipment Required 7-4
- Initial Setup 7-4
- Downstream Occlusion Calibration 7-5
- Upstream Occlusion Calibration 7-6
- Air Sensor Calibration 7-8
- Downstream Occlusion Calibration Pressure Test 7-9

Calibration Data Sheet 7-11

Overview

Baxter Healthcare Corporation recommends that these test and calibration procedures be performed on an annual basis and when any electronic or mechanical parts have been removed and/or replaced in the pump.

To perform these procedures, first refer to the disassembly procedures in Chapter 6 and disassemble the pump. If your facility is not equipped to perform the procedures in this chapter of the manual, call a Baxter representative for the procedure required to return the pump for service or repair.

It is recommended that the results of the tests and calibration be recorded on a copy of the Calibration Data Sheet provided at the end of this chapter. A copy of the Calibration Data Sheet should be kept as a preventive maintenance record for each pump.

Record the pump Product Code and Serial Number on the Calibration Data Sheet. If the Mechanism Assembly or MPU PCBA are replaced, enter the serial numbers of the new parts.

3V Backup Battery Test

Battery Load Test

This test MUST be performed before the NO LOAD test.

1. Create a **"**Load Circuit**"** using a 6.8K Ohm resistor with the parameters shown in Figure 7-1. Connect the Load Circuit to a Digital Multi-Meter (DMM), and set the meter to an "ohms" reading. Without connecting to the battery, the resistance value must read between 6.46 K and 7.14 K. If the value is outside this range, the Load Circuit must be reworked or replaced.

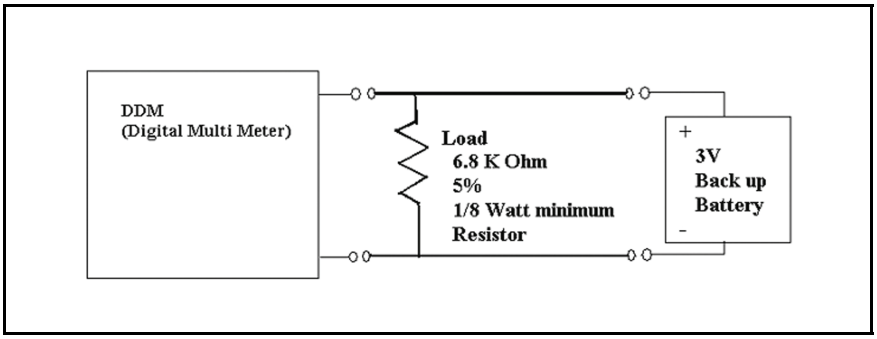


Figure 7-1. Battery Load Circuit

2. Set the DMM to an appropriate voltage range (>5V DC).
3. With the Load Circuit connected to the DMM, touch the DMM test leads to the appropriate (+ and -) terminals on the battery and hold for 4 seconds.
4. Note the 4-second voltage value, remove the test leads, and then record the voltage reading with a 3 decimal place accuracy (#.###), as the "V Load" reading on the Calibration Data Sheet.

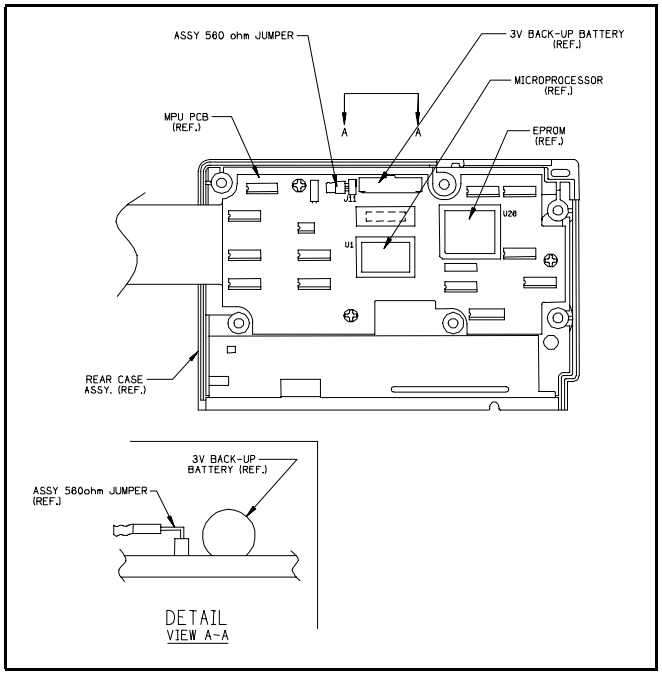


Figure 7-2. 3V Backup Battery

Battery No Load Test

NOTE: For this test, do not use the Load Circuit created for the previous procedure.

1. Using a DMM set to an appropriate voltage range (>5V DC), touch the DMM test leads to the appropriate (+ and -) terminals on the Battery.
2. Record the voltage reading with a 3 decimal place accuracy (#.###), as the “V No Load” reading on the Calibration Data Sheet.
3. Calculate the value of “V No Load - V Load” and record this voltage on the Calibration Data Sheet.
4. If the “V No Load” voltage is greater than or equal to 3.000 VDC, record “PASS” on the Calibration Data Sheet and proceed to the next step.

   If the “V No Load” voltage is less than 3.000 VDC, record “FAIL” and replace the 3V battery using the appropriate disassembly and reassembly instructions found in Chapter 6 of this manual.

NOTE: After replacement, test the new Backup Battery, and use a new Calibration Data Sheet.

5. If the calculated “V No Load - V Load” value is less than or equal to 0.050 volts, record “PASS” on the Calibration Data Sheet.

   If the calculated “V No Load - V Load” value is greater than 0.050 volts, record “FAIL” and replace the 3V Battery using the appropriate disassembly and reassembly instructions found in Chapter 6 of this manual.

NOTE: After replacement, retest the new Backup Battery, and use a new Calibration Data Sheet.

Calibration Procedure

This procedure must be performed on a pump whenever the MPU Circuit Board or the Mechanism Assembly is replaced. If a failure is encountered during any portion of this procedure, the MPU Circuit Board and/or the Mechanism Assembly should be repaired or replaced. Pumps that do not meet all the requirements of this calibration procedure MUST NOT BE USED.

NOTE: It is recommended that this calibration procedure be performed in the sequence provided. All potentiometers on the Secondary PCB will be adjusted.

Equipment Required

- Two Digital Voltmeters [DVM] with a minimum of 3 ½ digit auto-ranging and 1 megohm (or greater) input impedance on the DC volts range
- One set of mini-grabber clip test leads for each DVM
- One primed administration set
- One [empty tube] administration set
- One small electronic adjustment tool
- One AC Adapter (optional)
- Red GLPT (insulating varnish)
- Five small mini-clip jumpers
- One **Ipump** device calibration gauge (p/n AS4AL4002)
- One low point upstream calibration gauge (p/n B069290001)
- One high point upstream calibration gauge (p/n B069290000)

Initial Setup

1. Install a fresh 9-volt battery in the pump. (As an option, the AC Adapter may be used.)
2. If necessary, follow the procedures in Chapter 6 of this manual to open the pump case and access the component side of the Secondary PCB.
3. Connect DVM1- (common) to DVM2- (common) with a banana lead. Use the following test leads from the DVMs when required: DVM1+, DVM1-, & DVM2+
4. Turn on both DVMs and set them to read DC volts.

Downstream Occlusion Calibration

IMPORTANT: Do not turn the pump on!

1. Refer to Figure 7-3. Open the Tubing Door, insert the **Calibration Gauge** (p/n AS3AL4002) into the Tubing Channel, then close the Tubing Door.

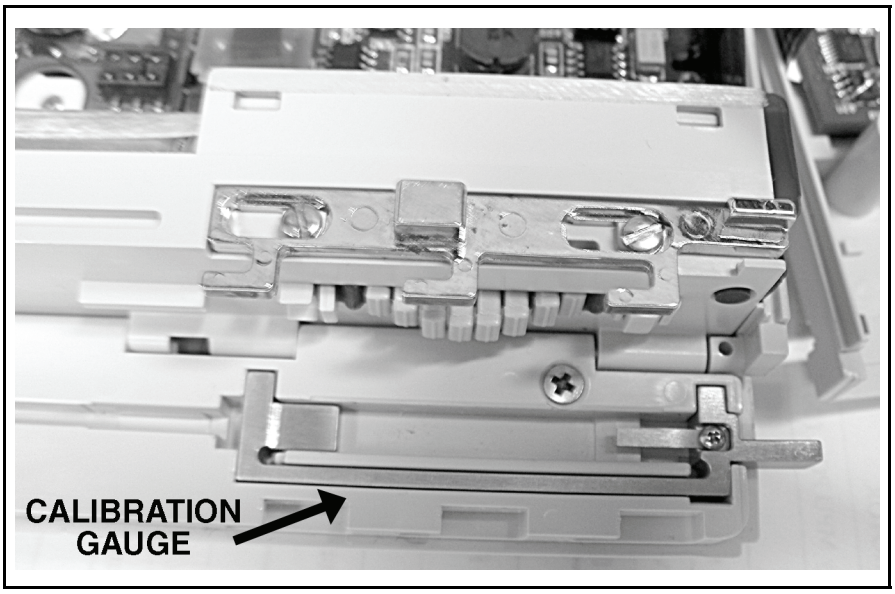


Figure 7-3. Calibration Gauge

2. Refer to Figure 7-4. Connect one mini-clip jumper from the black test post at J17 to the orange test post at J20.
3. Connect the DVM1+ test lead to the red test post at J15, and connect the DVM1- test lead to the black test post at J17.

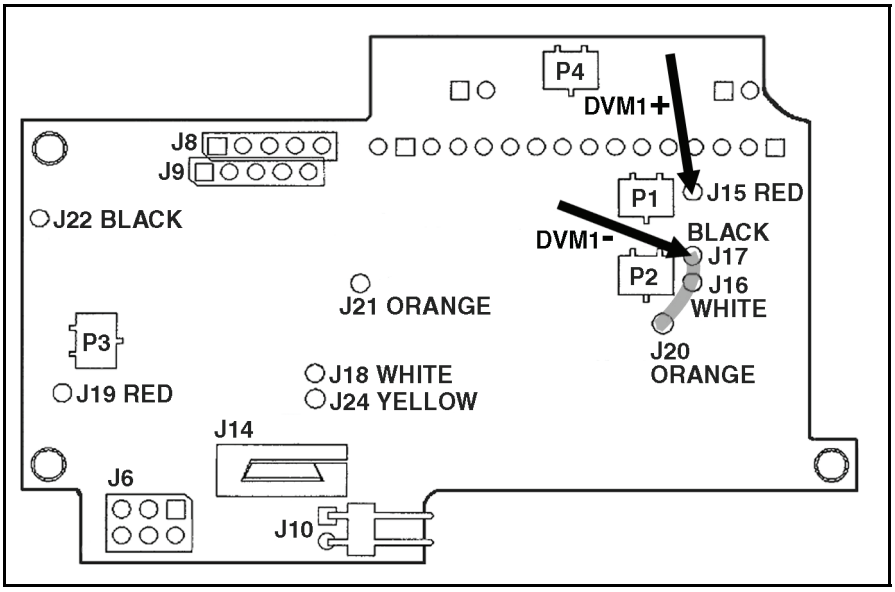


Figure 7-4. Downstream Occlusion Calibration

4. Adjust potentiometer P1 for an initial DVM1 reading of **1.50 to 2.50 VDC (target 1.90 to 2.10 VDC)**.

5. Open the Tubing Door and remove the **Calibration Gauge**, being careful not to damage the thin gauge spring.
6. With the Tubing Door open, record the DVM1 voltage with a three decimal place accuracy (#.###) as the "Downstream Open Without Set Value" on the Calibration Data Sheet.
7. Refer to Figure 7-5. Ensure the two brown pumping fingers adjacent to the upstream and downstream actuators are retracted fully into the mechanism. This may be accomplished by pressing on the other fingers until the brown fingers are retracted.
8. Load an empty tubing set and close the Tubing Door.
9. With the Tubing Door closed on the set, record the DVM1 voltage with a three decimal place accuracy (#.###) as the "Downstream Closed on Set Value" on the Calibration Data Sheet.
10. Compare the "Downstream Open Without Set Value" and the "Downstream Closed on Set Value" readings. The difference between the two must be greater than **116 mVDC** (**0.116 VDC**). Record the results on the Calibration Data Sheet.

NOTE: If the difference is less than **0.116 VDC**, the Mechanism Assembly must be repaired or replaced.

11. Open the Tubing Door and remove the set.

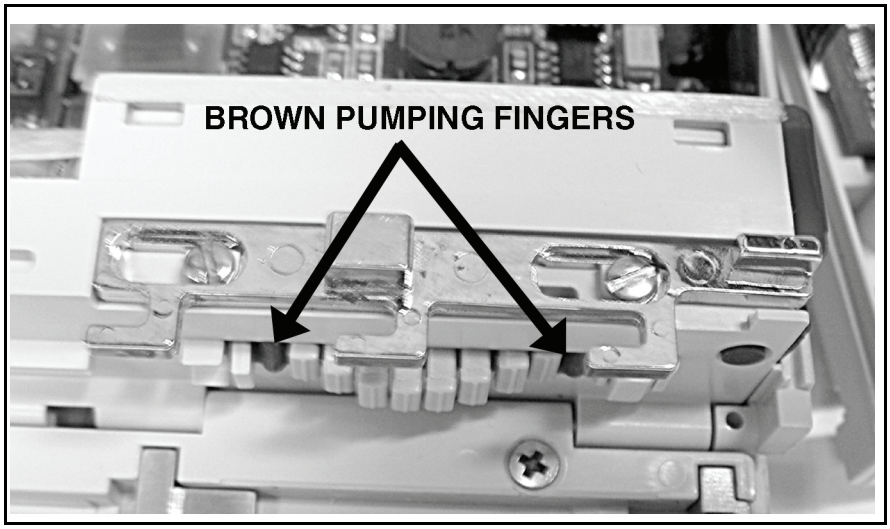


Figure 7-5. Brown Pumping Fingers

Upstream Occlusion Calibration

IMPORTANT: Do not turn the pump on!

1. Refer to Figure 7-5. Ensure the two brown pumping fingers adjacent to the upstream and downstream actuators are retracted fully into the mechanism. This may be accomplished by pressing on the other fingers until the brown fingers are retracted.
2. Insert the **High Point Upstream Calibration Gauge** (p/n B069290000) into the Tubing Channel, then close the Tubing Door.

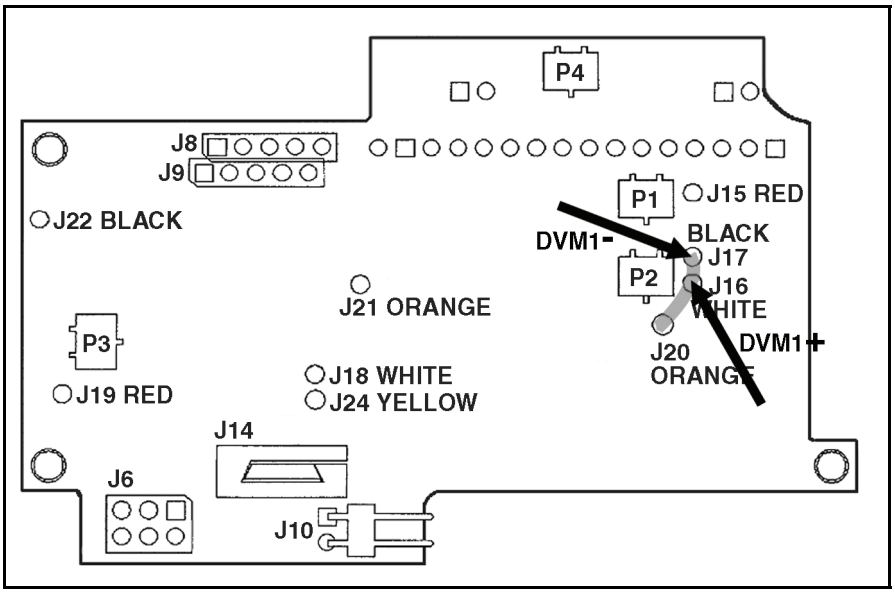


Figure 7-6. Upstream Occlusion Calibration

3. Move the DVM1+ test lead to the white test post at J16, and leave the DVM1- test lead on the black test post at J17.

4. Adjust potentiometer P2 for a DVM1 reading of **2.20 to 2.25 VDC**. Record the results on the Calibration Data Sheet.

NOTE: Always adjust potentiometer reading UP to the correct voltage. If the voltage reading is above the target voltage, adjust the potentiometer to reduce the value to below the target voltage then slowly adjust up to the target voltage.

5. Remove the **High Point Upstream Calibration Gauge** and replace it with the **Low Point Upstream Calibration Gauge** (p/n B069290001), then close the Tubing Door.

6. Adjust potentiometer P4 for a DVM1 reading of **1.10 to 1.15 VDC**. Record the results on the Calibration Data Sheet.

NOTE: Always adjust potentiometer reading UP to the correct voltage. If the voltage reading is above the target voltage, reduce the value to below the target voltage then slowly adjust up to the target voltage.

7. Repeat this procedure starting at step 2 until both target voltages can be attained without adjustments. Record the final readings on the Calibration Data Sheet.

8. Open the Tubing Door and remove the **Low Point Upstream Calibration Gauge** from the Tubing Channel.

9. With the Tubing Door open, record the DVM1 voltage with a three decimal place accuracy (#.###) as the "Upstream Open Without Set Value" on the Calibration Data Sheet.

10. Ensure that the two brown pumping fingers adjacent to the upstream and downstream actuators are retracted fully into the mechanism.

11. Load an empty tubing set and close the Tubing Door.

12. With the Tubing Door closed on the set, record the DVM1 voltage with a three decimal place accuracy (#.###) as the "Upstream Closed on Set Value" on the Calibration Data Sheet.

13. Compare the "Upstream Open Without Set Value" and the "Upstream Closed on Set Value" readings. The difference between the two must be greater than **150 mVDC** (**0.150 VDC**). Record the results on the Calibration Data Sheet.

NOTE: If the difference is less than **0.150 VDC**, the Mechanism Assembly must be repaired or replaced.

14. Open the Tubing Door and remove the set.

15. Move the DVM1+ test lead to J15. With no calibration gauge installed, the voltage on DVM1 must read less than **1.7 VDC**. Record the results on the Calibration Data Sheet.

NOTE: If the reading is not less than **1.7 VDC**, the Mechanism Assembly must be repaired or replaced.

16. Remove the test leads from the pump.

Air Sensor Calibration

IMPORTANT: Do not turn the pump on!

1. Refer to Figure 7-7. Connect one mini-clip jumper from the black test post at J17 to the orange test post at J21.

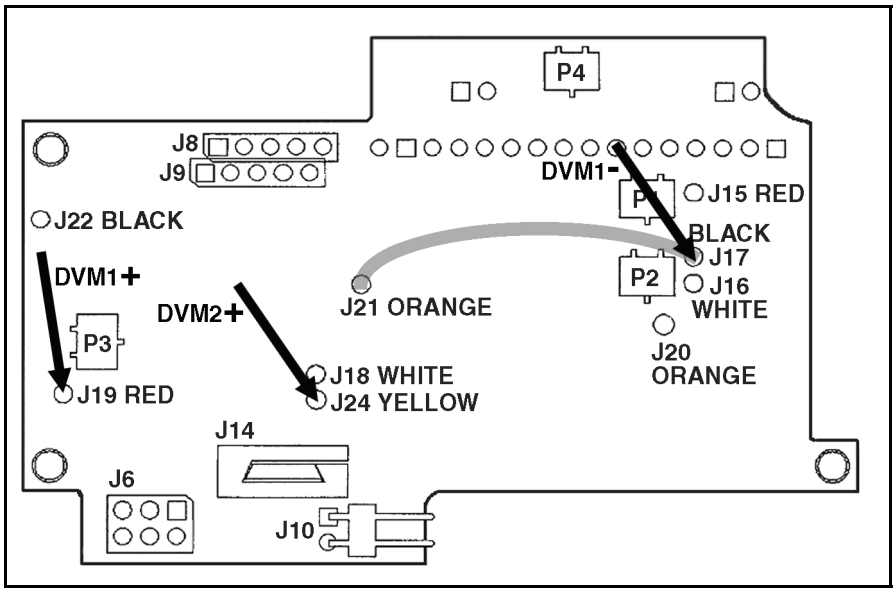


Figure 7-7. Air Sensor Calibration

NOTE: For this process, the two DVMs will be used as follows:

- DVM1 = Air Sensor calibration value
- DVM2 = Air Sensor output voltage

2. Refer to Figure 7-7. Connect the DVM test leads as follows:
   - DVM1- (common) to DVM2- (common)
   - DVM1 + Test Post J19 (Red)

- DVM1 - Test Post J17 (Black)
- DVM2 + Test Post J24 (Yellow)

NOTE: Prior to performing Air Sensor calibration, make sure the Mechanism Assembly tubing channel, and the tubing segment are clean and dry.

3. Turn on both DVMs and set them to read DC volts.
4. Ensure a 9-volt battery is installed in the pump.
5. Insert the air filled [empty] tubing set into the pump, then fully close the tubing cover.

IMPORTANT: Do not turn the pump on!

6. With the small adjustment tool, rotate potentiometer P3 counterclockwise until DVM1 indicates a voltage value that is less than **0.120 VDC**. If DVM1 is already less than **0.120 VDC**, no counterclockwise adjustment of P3 is required.
7. With the small adjustment tool, slowly turn potentiometer P3 clockwise. DVM2 will jump from a low level (**<0.1 VDC**) to a high level (**>4.9 VDC**). When the reading on DVM2 changes to a high level (**>4.9 VDC**), continue to slowly rotate potentiometer P3 clockwise. The reading on DVM2 will suddenly drop back to a low level (**<0.1 VDC**) reading.
8. At this point, record the DVM1 voltage reading on the Calibration Data Sheet.
9. Verify that DVM2 reading is a low level (**<0.1 VDC**) and is stable (not varying), then mark PASS or FAIL on the Calibration Data Sheet. (It may be necessary to slowly readjust potentiometer P3 until a stable reading is observed.)
10. Add **0.120 VDC** to the recorded DVM1 voltage and record the calculated voltage level on the Calibration Data Sheet.
11. Using the small adjustment tool, adjust potentiometer P3 so that the DVM1 reading is within **± 0.010 volts** of the calculated voltage level. Record the DVM1 reading on the Calibration Data Sheet.
12. At this time, with the empty tubing set installed, DVM2 must indicate a voltage level **<0.1 VDC**. Record the reading on the Calibration Data Sheet.
13. Open the Tubing Door, remove the empty tubing segment, and insert a primed tubing set. Ensure that the set is properly primed (i.e., no air pockets or bubbles in the tubing channel area), then close the Tubing Door.
14. With a primed set installed, DVM2 must indicate a voltage level **>4.9 VDC**. Record the reading on the Calibration Data Sheet.
15. Remove the test leads and tubing set from the pump.

Downstream Occlusion Calibration Pressure Test

1. Close-up the pump and install a fluid-filled tubing set into the pump.
2. Connect the set to a pressure gauge with a minimum range of **0 – 30 psi**.
3. Program the Pump as follows:
   - Mode = PCA
   - Units = mL

- Set fluid volume = 0100 mL

4. Program the Pump as Follows:
   - PCA DOSE = 1.0 mL
   - DELAY = 3 minutes
   - 1 HR LIMIT = 10.0 mL
   - BOLUS = 05.0 mL
5. Start the bolus infusion and let the pump run until it goes into a downstream occlusion alarm.
6. Observe the Occlusion Pressure Value and record the reading on the Calibration Data Sheet.
   - If the reading is between **15 and 29 psi**, record the value on the Calibration Data Sheet.
   - If the reading is outside these limits, repeat the Downstream Occlusion Calibration and this pressure test.
     - If the pressure was high, adjust the voltage higher.
     - If the pressure was low, adjust the voltage lower.

     Continue this loop until the downstream occlusion value is **22 ± 7 psi**.
7. Disconnect the test apparatus from the pump.
8. Place a small amount of GLPT (insulating varnish) on the adjustment screws of potentiometers P1, P2, P3, and P4 to secure them in place.

Pump Calibration is now complete. Ensure the Calibration Data Sheet is properly reviewed and signed, then refer to Chapter 6 and perform the required internal inspection steps as you reassemble the pump.

Calibration Data Sheet

Record the results of the **Ipump** device calibration here. This sheet may be reproduced.

Product Code: **2L3107** [ ] **2L3107R** [ ] **2L3107K** [ ] PUMP SERIAL NUMBER: _____

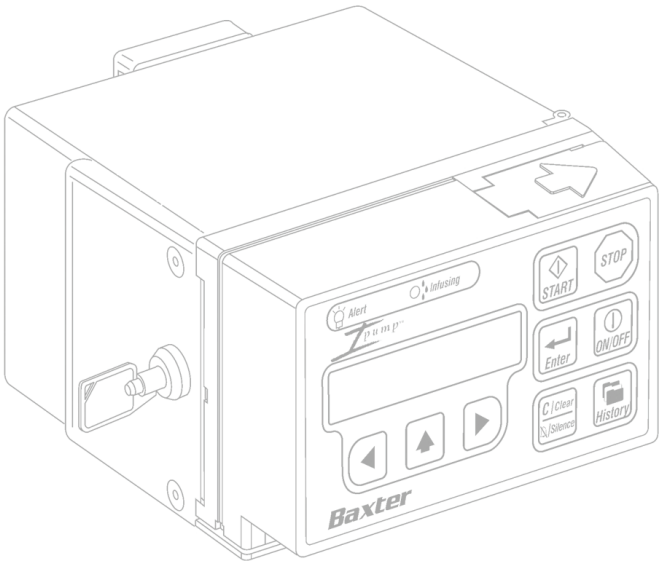
If the Mechanism Assembly or the MPU PCBA is replaced, enter the Serial Numbers of these replacement parts.

Mechanism Assembly Serial Number: _____
MPU PCBA Serial Number: _____

PROCEDURE STEPS	READING	N/A	PASS	FAIL
3V Backup Battery Test				
LOAD TEST, "V LOAD" reading (VDC)		[ ]		
NO LOAD TEST, "V NO LOAD" reading (VDC)		[ ]	[ ]	[ ]
Calculated "V NO LOAD – V LOAD" value (VDC)		[ ]	[ ]	[ ]
Downstream Occlusion Calibration				
Downstream Open Without Set Value				
Downstream Closed On Set Value				
Difference between Open and Closed values (**>0.116 VDC**)				
Upstream Occlusion Calibration				
2.20 ≤ P2 voltage ≤ **2.25 VDC** (Final Reading)		[ ]	[ ]	[ ]
1.10 ≤ P4 voltage ≤ **1.15 VDC** (Final Reading)		[ ]	[ ]	[ ]
Voltages meet above conditions w/o adjustment	N/A	[ ]	[ ]	[ ]
Upstream Open Without Set Value				
Upstream Closed On Set Value				
Difference between Open and Closed values (**>0.150 VDC**)				
Voltage **<1.7 VDC**		[ ]	[ ]	[ ]
Air Sensor Calibration				
Record DVM1 reading		[ ]	[ ]	[ ]
DVM2 reading < **0.1** (and stable)	N/A	[ ]	[ ]	[ ]
Calculated Sum of DVM1 **+ 0.120 VDC**		[ ]		
DVM1 reading = ± **0.010 VDC**		[ ]	[ ]	[ ]
DVM2 reading < **0.1 VDC**	N/A	[ ]	[ ]	[ ]
DVM2 reading > **4.9 VDC**	N/A	[ ]	[ ]	[ ]
Downstream Occlusion Calibration Pressure Test				
The Pressure Reading is 15 psi to 29 psi		[ ]	[ ]	[ ]

Signature: _____DATE: _____

Reviewed by: _____DATE: _____


Alert
Infusing
START
STOP
Enter
ON/OFF
Clear
Silence
History
Baxter

8 - Electronic Assembly Drawings

In this section **Page**

Overview 8-1
Interconnecting Wiring Diagram 8-1
Keypad Cable & Motor Connectors 8-2
Mechanism Assembly Flex-Circuit Connector. 8-2
MPU PCBA Assembly 8-3
Direction & Drive Motor Module PCBA (DDMM) Daughter Board 8-4

Overview

This chapter contains the interconnecting wiring diagram, the electrical connector pinouts, and the circuit board assembly drawings for the pump.

Interconnecting Wiring Diagram

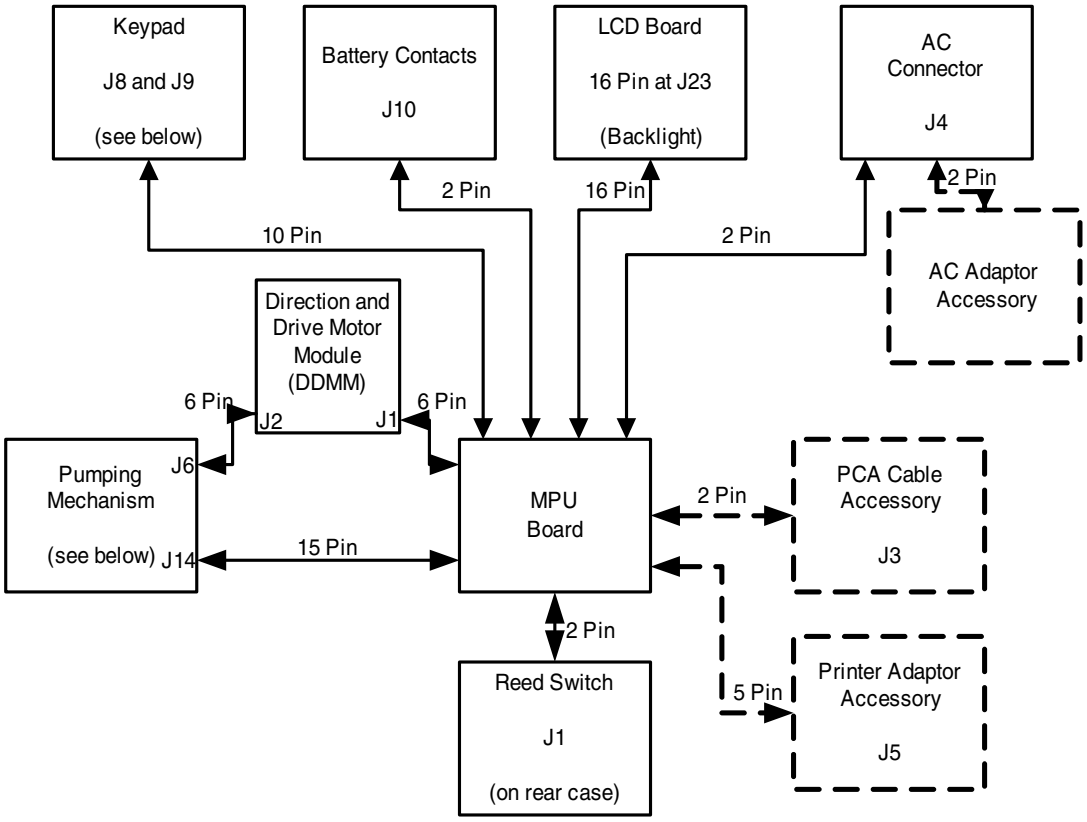


Figure 8-1. interconnecting Wiring Diagram

Keypad Cable & Motor Connectors

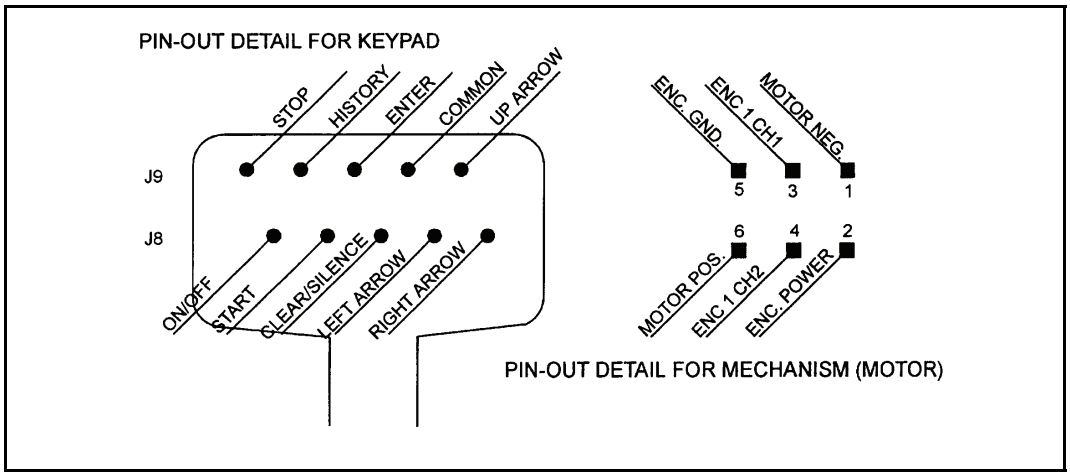


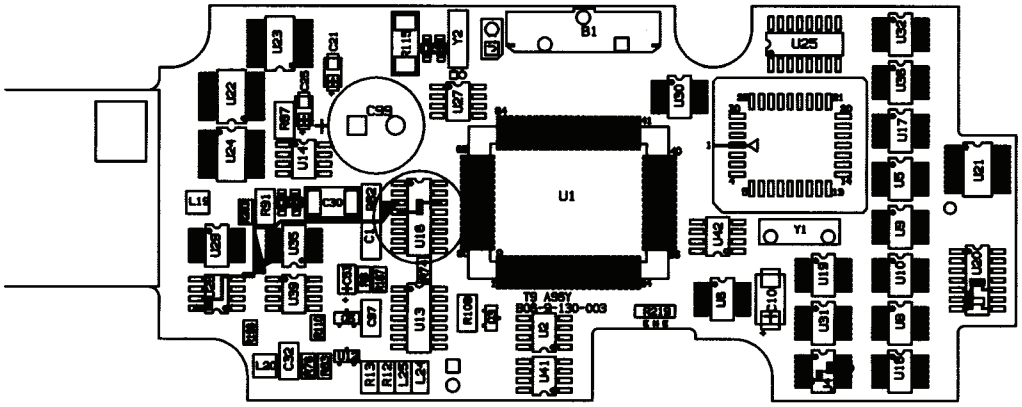
Figure 8-2. Keypad Cable & Motor Connectors Pinouts

Mechanism Assembly Flex Circuit Connector

Pin No.	Feature
1	XMIT LO
2	XMIT HI
3	NOT CONNECTED
4	NOT CONNECTED
5	RCVR LO
6	RCVR HI
7	DOWNSTREAM -
8	DOWNSTREAM +
9	UPSTREAM +
10	UPSTREAM -
11	OCCLUSION V+
12	OCCLUSION V-
13	PUMP COVER
14	COMMON
15	REED SWITCH ENC2

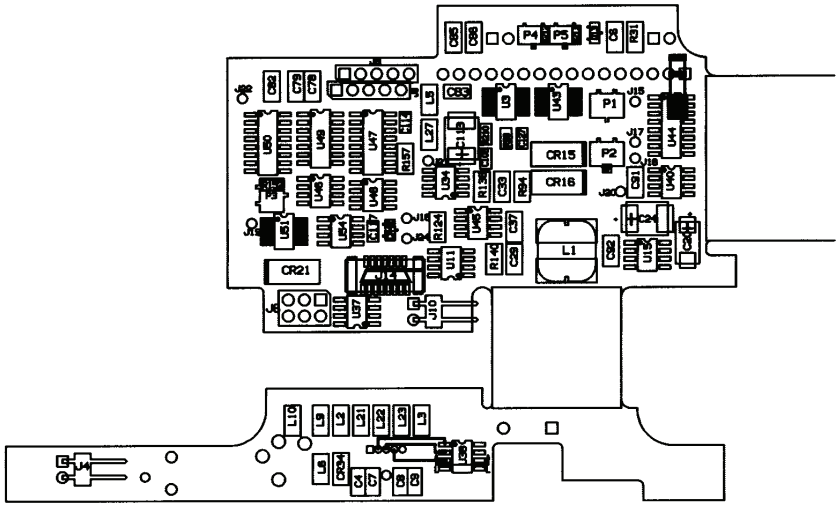
Table 8-1. Mechanism Assembly Flex-Circuit Connector Pinouts

MPU PCBA Assembly



Primary PCB

Secondary PCB



Connector PCB

Figure 8-3. MPU PCBA Assembly

Direction & Drive Motor Module PCBA (DDMM) Daughter Board

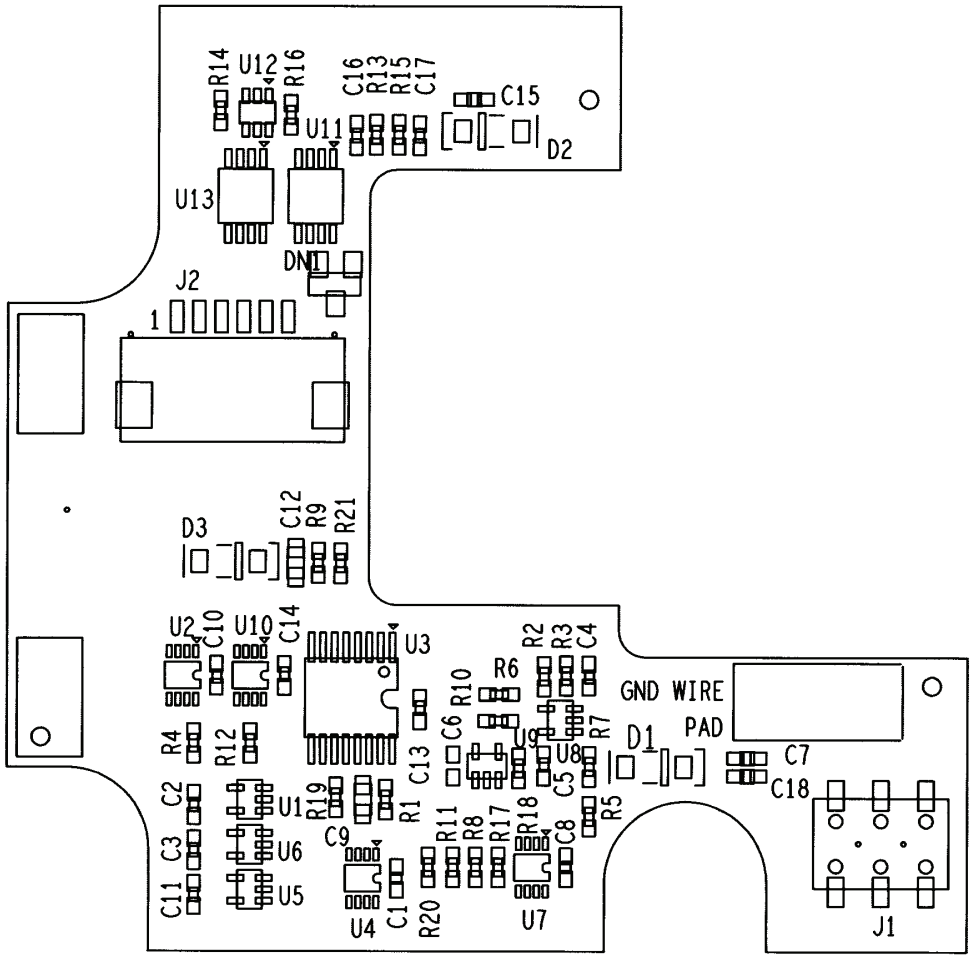


Figure 8-4. DIRECTION AND DRIVE MOTOR MODULE PCBA (Daughter Board)

9 - Repair Parts

In this section **Page**

Overview 9-1
Assembly Parts Lists 9-2
- Bag Cover Assembly 9-2
- Rear Case Assembly 9-3
- Pump Mechanism & Battery Compartment Assemblies 9-4
- MPU Board Assembly 9-5
- LCD Circuit Board & Front Case Assemblies 9-6

Alphabetical Parts Lists 9-7
Numerical Parts Lists 9-9

Overview

This chapter contains a listing of the repair parts available for the pump. Three listings are provided.

- Assembly Parts List
- Alphabetical Parts List
- Numerical Parts List

The Alphabetical and Numerical lists are cross-referenced to the assembly-specific parts list by both figure and index number.

Assembly Parts List

Bag Cover Assembly

Figure ID	Part Description	Baxter Part Number	Qty per Assembly
A1	500 mL Bag Cover Assembly or 250 mL Extended Bag Cover Assembly or 250 mL Extended Bag Cover Assembly, Amber or 250 mL Bag Cover Assembly or 100 mL Bag Cover Assembly (Each of the above parts include items A2 and A4)	2L3221 2L3217 2L3261 2L3220 2L3218	1
A2	#6 x 5/16" Self-Tap Screw	5101180	2
A3	2-56 x 1/4" Pan Head Screw	5101101	3
A4	Mounting Plate	6465644	1
A5	Hinge Cover	4909620001	1

Table 9-1. Bag Cover Assembly

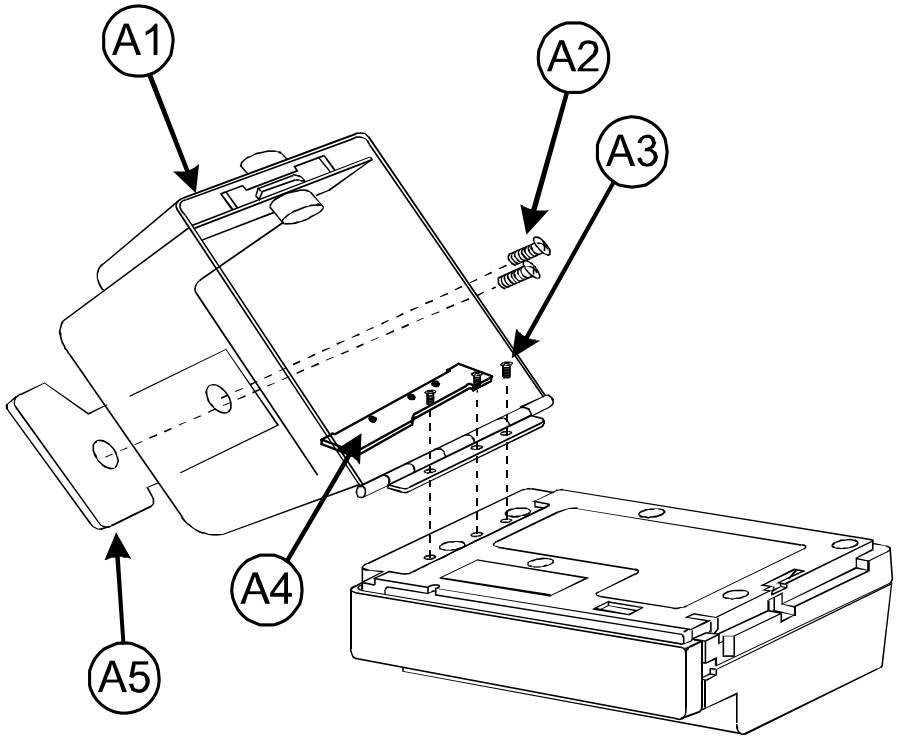


Figure 9-1. Bag Cover Assembly

Rear Case Assembly

Figure ID	Part Description	Baxter Part Number	Qty per Assembly
B1	Rear Case Assembly	B069120007RP	1
B2	2-56 x 3/8" Pan Head Screw	5101103	6
B3	#2 Flat Washer	5143011	6
B4	Label, Rear (Global) or Label, Rear (US)	072652773 072652741	1 1
B5	DDMM Hold-down Foam (not shown)	B069090000	2

Table 9-2. Rear Case Assembly

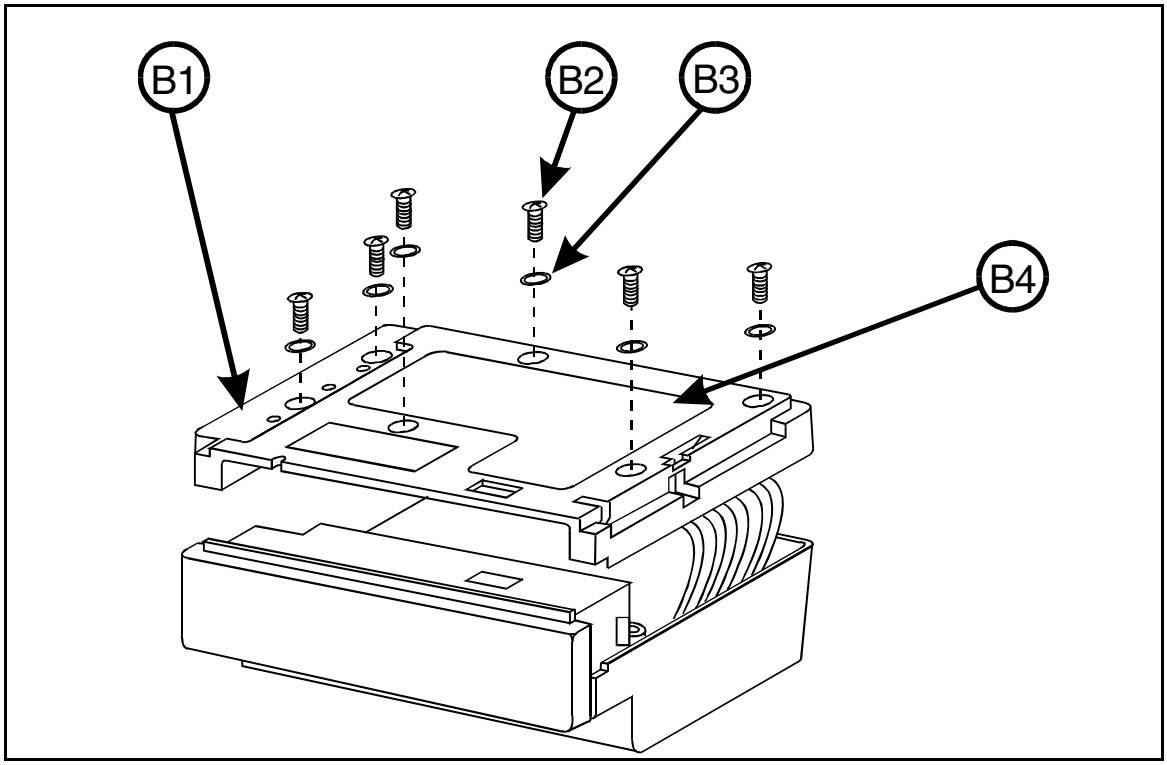


Figure 9-2. Rear Case Assembly

Pump Mechanism & Battery Compartment Assemblies

Figure ID	Part Description	Baxter Part Number	Qty per Assembly
C1	Mechanism Assembly	B069120016RP	1
C2	Battery Wall Assembly	B069120008RP	1
C3	Battery Polarity Label	6465560	1
C4	2-56 x 3/8” Pan Head Screw	5101103	1
C5	Retainer Bracket, Motor	B069620031	1
C6	Battery Door	B069620008	1
C7	Direction and Drive Motor Module (DDMM) (Daughter Board)	B069130010	1

Table 9-3. Pump Mechanism & Battery Compartment Assemblies

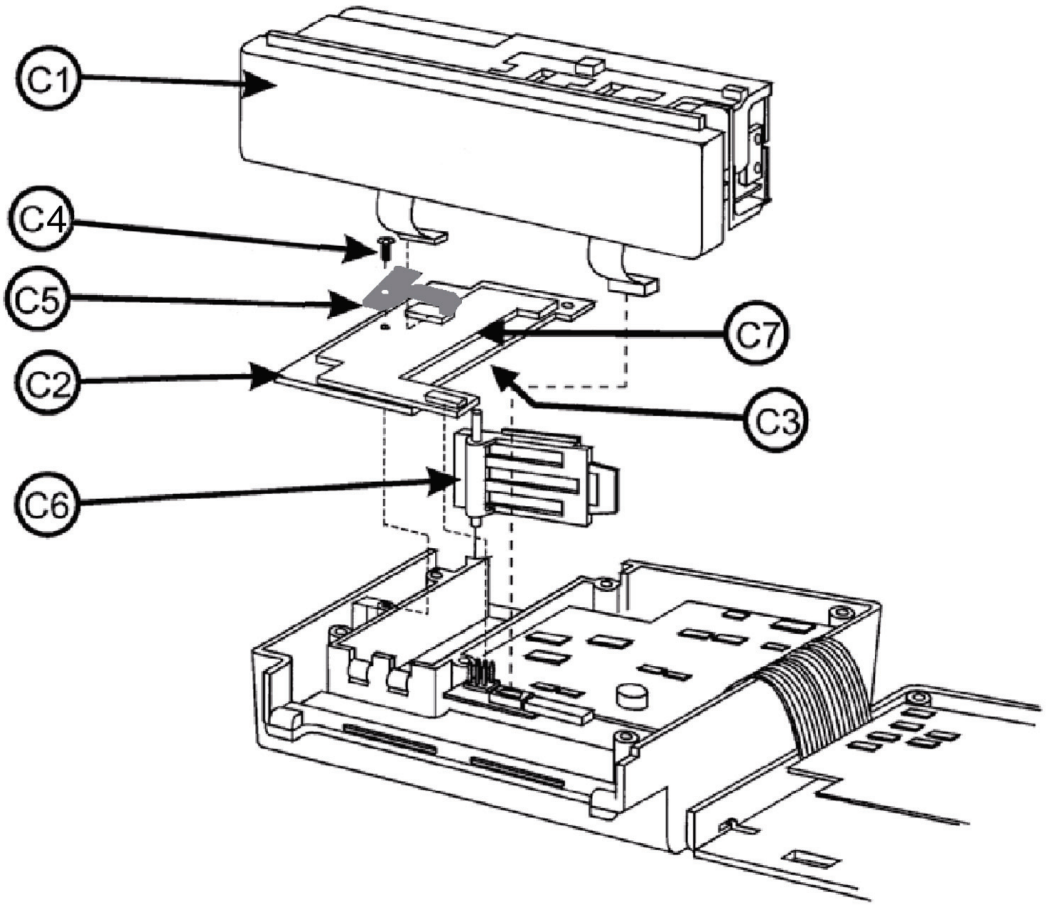


Figure 9-3. Pump Mechanism & Battery Compartment Assemblies

MPU Board Assembly

Figure ID	Part Description	Baxter Part Number	Qty per Assembly
D1	MPU Board Assembly (Includes items D2 and D3)	B069130013RP	1
D2	3V Backup Battery	6465634	1
D3	2-Pin Jumper Connector Assembly	B069110001	1
D4	2-56 x 1/4" Pan Head Screw	5101101	10
D5	#2 Spring Lockwasher	5110049	10

Table 9-4. MPU Board Assembly

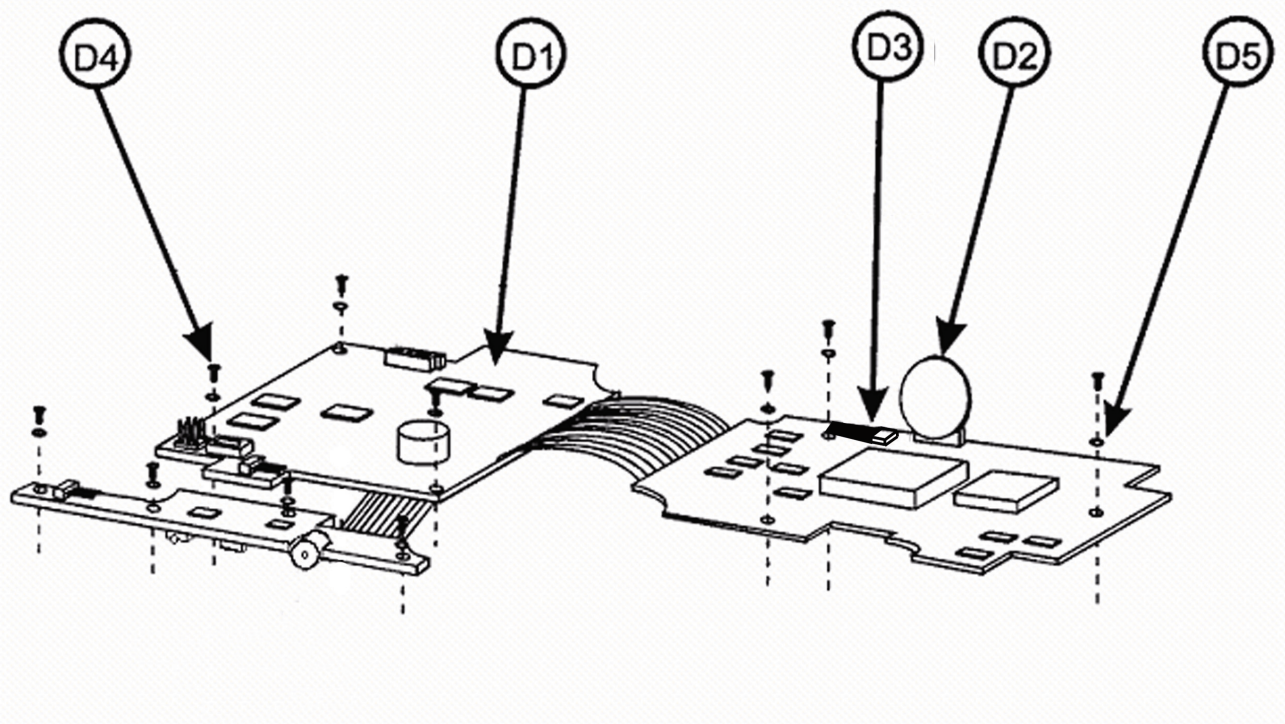


Figure 9-4. MPU Board Assembly

LCD Circuit Board & Front Case Assemblies

Figure ID	Part Description	Baxter Part Number	Qty per Assembly
E1	LCD Circuit Board Assembly	B069494000	1
E2	2-56 Standoff	5125114	3
E3	2-56 x 1/4" Pan Head Screw	5101101	1
E4	#2 Spring Lockwasher	5110049	1
E5	Front Case with Keypad Assembly	B069180004RP	1
E6	Battery Contact Assembly	6465570RP	1
E7	Keypad Assembly (includes E8 below)	B069610006RP	1
E8	Keypad Spacer	6465614	1
E9	PCA Cable Retaining Clip	B069620032	1
E10	ESD Flex Circuit	B069110002	1
E11	Display ESD Shield	B069610005	1
E12	Label, Printer Port	B069810004	1
E13	Label, ESD Sensitive Area Symbol	072745982	1

Table 9-5. LCD Circuit Board & Front Case Assemblies

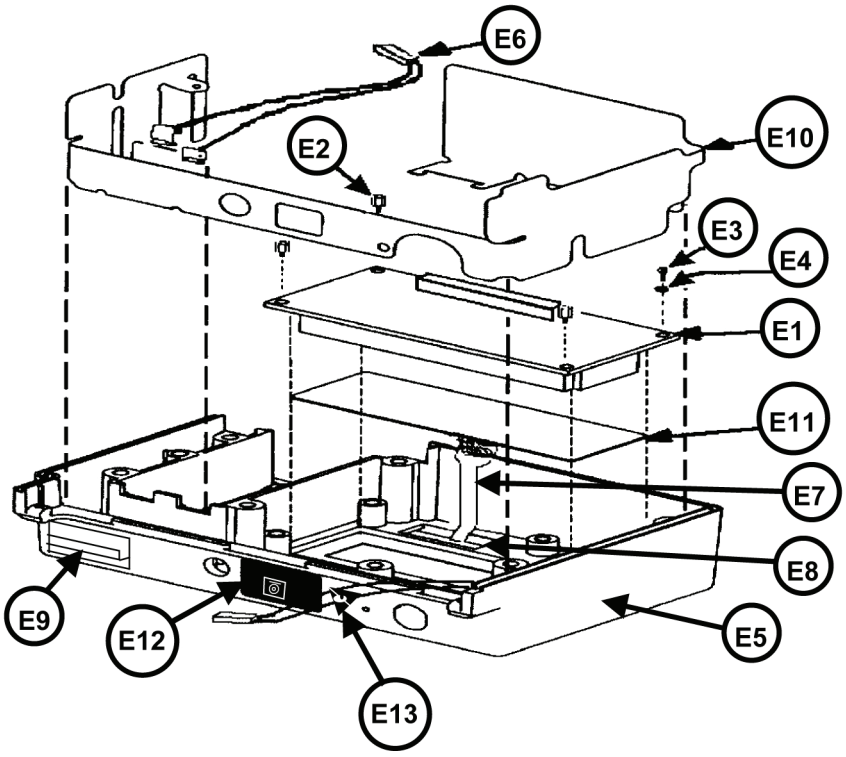


Figure 9-5. LCD Circuit Board & Front Case Assemblies

Alphabetical Parts List

Description	Baxter Part Number	Figure Number	Index Number	Qty per pump
#2 Flat Washer	5143011	9-2	B3	6
#2 Spring Lockwasher	5110049	9-5	E4	1
#2 Spring Lockwasher	5110049	9-4	D5	10
#6 x 5/16" Self-Tap Screw	5101180	9-1	A2	2
100 mL Bag Cover Assembly	2L3218	9-1	A1	Optional
250 mL Bag Cover Assembly	2L3220	9-1	A1	Optional
250 mL Extended Bag Cover Assembly	2L3217	9-1	A1	1
250 mL Ext. Bag Cover Assy, Amber	2L3261	9-1	A1	Optional
2-56 Standoff	5125114	9-5	E2	3
2-56 x 1/4" Pan Head Screw	5101101	9-1	A3	3
2-56 x 1/4" Pan Head Screw	5101101	9-4	D4	10
2-56 x 1/4" Pan Head Screw	5101101	9-5	E3	1
2-56 x 3/8" Pan Head Screw	5101103	9-2	B2	6
2-56 x 3/8" Pan Head Screw	5101103	9-3	C4	1
2-Pin Jumper Connector Assembly	B069110001	9-4	D3	1
3V Backup Battery	6465634	9-4	D2	1
500 mL Bag Cover Assembly	2L3221	9-1	A1	Optional
Battery Contact Assembly	6465570RP	9-5	E6	1
Battery Door	B069620008	9-3	C6	1
Battery Polarity Label	6465560	9-3	C3	1
Battery Wall Assembly	B069120008RP	9-3	C2	1
Direction and Drive Motor Module (DDMM) (Daughter Board)	B069130010	9-3	C7	1
Display ESD Shield	B069610005	9-5	E11	1
ESD Flex Circuit	B069110002	9-5	E10	1
Front Case with Keypad Assembly	B069180004RP	9-5	E5	1
Hinge Cover	4909620001	9-1	A5	1
Hold-down Foam, DDMM	B069090000	9-2	B5	2
Keypad Assembly with Spacer	B069610006RP	9-5	E7	1
Keypad Spacer	6465614	9-5	E8	1
Label, ESD Sensitive Area Symbol	072745982	9-5	E13	1

Description	Baxter Part Number	Figure Number	Index Number	Qty per pump
Label, Printer Port	B069810004	9-5	E12	1
Label, Rear (Global)	072652773	9-2	B4	1
Label, Rear (US)	072652741	9-2	B4	1
LCD Circuit Board Assembly	B069494000	9-5	E1	1
Mechanism Assembly	B069120016RP	9-3	C1	1
Mounting Plate	6465644	9-1	A4	1
MPU Board Assembly	B069130013RP	9-4	D1	1
Rear Case Assembly	B069120007RP	9-2	B1	1
Retainer Bracket, Motor	B069620031	9-3	C5	1
Retaining Clip, PCA Cable	B069620032	9-5	E9	1

Numerical Parts List

Baxter Part Number	Description	Figure Number	Index Number	Qty per pump
072652741	Label, Rear (US)	9-2	B4	1
072652773	Label, Rear (Global)	9-2	B4	1
072745982	Label, ESD Sensitive Area Symbol	9-5	E13	1
2L3217	250 mL Extended Bag Cover Assembly	9-1	A1	1
2L3218	100 mL Bag Cover Assembly	9-1	A1	Optional
2L3220	250 mL Bag Cover Assembly	9-1	A1	Optional
2L3221	500 mL Bag Cover Assembly	9-1	A1	Optional
2L3261	250 mL Ext. Bag Cover Assembly, Amber	9-1	A1	Optional
4909620001	Hinge Cover	9-1	A5	1
5101101	2-56 x 1/4" Pan Head Screw	9-1	A3	3
5101101	2-56 x 1/4" Pan Head Screw	9-4	D4	10
5101101	2-56 x 1/4" Pan Head Screw	9-5	E3	1
5101103	2-56 x 3/8" Pan Head Screw	9-2	B2	6
5101103	2-56 x 3/8" Pan Head Screw	9-3	C4	1
5101180	#6 x 5/16" Self-Tap Screw	9-1	A2	2
5110049	#2 Spring Lockwasher	9-5	E4	1
5110049	#2 Spring Lockwasher	9-4	D5	10
5125114	2-56 Standoff	9-5	E2	3
5143011	#2 Flat Washer	9-2	B3	6
6465560	Battery Polarity Label	9-3	C3	1
6465570RP	Battery Contact Assembly	9-5	E6	1
6465614	Keypad Spacer	9-5	E8	1
6465634	3V Backup Battery	9-4	D2	1
6465644	Mounting Plate	9-1	A4	1
B069090000	Hold-down Foam, DDMM	9-2	B5	2
B069110001	2-Pin Jumper Connector Assembly	9-4	D3	1
B069110002	ESD Flex Circuit	9-5	E10	1
B069120007RP	Rear Case Assembly	9-2	B1	1
B069120008RP	Battery Wall Assembly	9-3	C2	1
B069120016RP	Mechanism Assembly	9-3	C1	1
B069130010	Direction and Drive Motor Module (DDMM) (Daughter Board)	9-3	C7	1

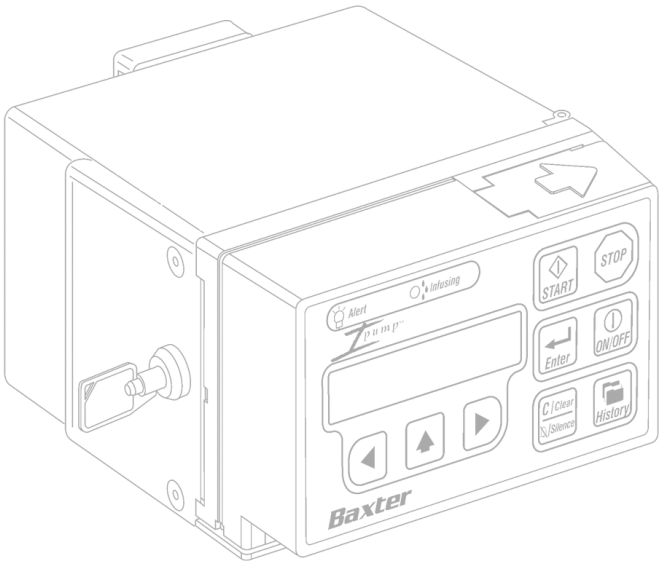
Baxter Part Number	Description	Figure Number	Index Number	Qty per pump
B069130013RP	MPU Board Assembly	9-4	D1	1
B069180004RP	Front Case with Keypad Assembly	9-5	E5	1
B069494000	LCD Circuit Board Assembly	9-5	E1	1
B069610005	Display ESD Shield	9-5	E11	1
B069610006RP	Keypad Assembly with Spacer	9-5	E7	1
B069620008	Battery Door	9-3	C6	1
B069620031	Retainer Bracket, Motor	9-3	C5	1
B069620032	Retaining Clip, PCA Cable	9-5	E9	1
B069810004	Label, Printer Port	9-5	E12	1

10 - Product Updates

In this section	Page
Overview	10-1

Overview

This chapter describes major updates to the **Ipump** device. The updates are listed by serial number and/or hardware and software revision number of when the change occurred. In many instances a different part number is assigned for compatibility reasons. To ensure proper fit and operation of parts, make sure that you check all updates that may apply to a particular serial number.


Alert
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